Chemical Industries

DECEMBER 1950

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BOOKS FOR INDUSTRY

Chemical Kinetics, by Keith J. Laidler. McGraw-Hill Book Co., New York; ix+ 394 pp., $5.50.

INTENDED AS a fundamental text for the university student, this book presents the important facts and theories governing chemical reaction rates. Thorough coverage of all classes of reactions with the application of theory to experimental data is included with emphasis on a clear fundamental approach. Recent developments in the theory of reaction rates, complex reactions, photochemistry, radiochemistry, catalysis, oxidation, polymerization are considered with a final chapter devoted to the nature of the chemical complex and certain process mechanisms.

Laboratory Fractional Distillation, by Thomas P. Carney. The MacMillan Co., New York; vii+ 259 pp., $5.75.

THE AUTHOR has strived to present all the pertinent information on theory, techniques and equipment related to the subject in such a way as to give the reader a practical working knowledge of fractional distillation. Application of techniques to the preparation of pure compounds and the analysis of complex mixtures will be of value to both the researcher and the student. Descriptions and comparisons of current equipment and suggestions for its most beneficial utilization in specific instances are outstanding features. Discussion of azeotropic and molecular distillation for the treatment of materials not separable by fractional methods is included for complete coverage of distillation practice. The book contains many drawings of recommended equipment, complete with dimensions.

The Theory and Practice of Industrial Research, by David B. Hertz. McGraw-Hill Book Co., New York; xiii+385 pp., $5.50.

NOBODY FAMILIAR with the state of modern industry need be convinced of the importance of research in the scheme of things. At the present time, nearly half of the nation's scientific personnel are employed in industry.

This book strives to point out the elements contributing to the efficient use of creative resources. It analyzes the components of the research operation and deduces therefrom, in a general sense, the most profitable organization and structure. Such significant topics as cost and time elements, personnel selection and administration, facilities, patents, etc., are examined. The author stresses the point "that the entire organizational pattern should be such as to reinforce the creative abilities of the personnel." To achieve this goal, sound policies of project selection and research administration are essential.

Organophosphorous Compounds, by Gennady M. Kosolapoff. John Wiley & Sons, Inc., New York; vii+ 376 pp., $7.50.

A MAJOR need in the literature has been greatly alleviated by this work which deals with the general aspects of the organic chemistry of phosphorus. Never before has there been a volume of this scope available in the English language.

The book covers all known organophosphorus compounds, including synthetic methods of preparation, physical and chemical properties. It performs a real service by compiling a great wealth of information, previously available only from a great variety of sources.

Colloidal Dispersions, by Earl K. Fischer. John Wiley & Sons, Inc., New York; vii+ 387 pp., $7.50.

PROBABLY THE first to cover both theoretical and practical considerations of colloidal dispersions, this work will be of value to both the theoretical chemist and his industrial counterpart. The theme is that the nature and extent of liquid-solid interface determines the physical properties and manufacturing requirements of dispersions. To implement this idea, methods of producing different physical properties are given with experimental approaches for gauging the interface of dispersed particles.

Theoretical background for industrial work (particle size, wetting, physical state, rheological properties) is presented in the first half of the book. The remainder is devoted to manufacturing data with very adequate coverage of all types of colloid mills.

The Chemistry and Metallurgy of Miscellaneous Materials, edited by Laurence L. Quill. McGraw-Hill Book Co., New York, New York; xxii + 329 pp., $3.00.

A PORTION of the research work done for the Manhattan Project and the Atomic Energy Commission is covered in this volume. Different authors have written each chapter. The papers here are concerned primarily with the thermodynamics of various metals and metal halides, nitrides, carbides, sulfides, silicides and phosphides, and of the common gases.

A Method of Coding Chemicals for Correlation and Classification, National Research Council, Washington 25, D. C.; 98 pp., $1.50.

HERE IS a chemical code developed by the staff of the Chemical Codification Panel of The National Research Council, devised primarily to permit the use of punched cards in the correlation of chemical structure with biological action. Presented in the booklet are rules and directions for coding organic and inorganic compounds; a listing of code symbols; description of code usage in connection with punched cards, and many examples of the system in operation.

Advanced Organic Chemistry, by Reynold C. Fuson. John Wiley & Sons, Inc., New York; x + 667 pp., $8.00.

A BOOK intended for students continuing their study of organic chemistry beyond the elementary level. Emphasis is placed on the fundamental behavior patterns of organic compounds and correlation of their reactions. Instances of synthetic value and reactions of interest to modern organic research are highlighted throughout the volume.

The subject matter is arranged by type reactions, in the belief that such a presentation constitutes a departure from conventional texts and will be most profitable to the student.

Plasma Proteins, edited by John B. Youmans. Charles C. Thomas, Publisher, Springfield, Ill.; xviii+ 352 pp., $6.50.

A VOLUME of papers on the fundamental and clinical aspects of plasma proteins. The original research presented in this collection, performed by outstanding figures in the field, was presented at a 1949 symposium sponsored by the Robert Gould Research Foundation. Included in the context are discussions of the physical and chemical nature of the serum proteins, their formation, biosynthesis, relation to dietary proteins, immunochemical processes and various clinical conditions.

The Essential Oils, by Ernest Guenther. D. Van Nostrand Co., Inc., New York; xiv+ 751 pp., $12.00.

THIS SERIES of monographs, intended for practical use by the chemist, essential oil producer and dealer is arranged according to the botanical family of plants from which the various oils are derived. Number four of a series, the work contains a great deal of useful working information in addition to illustrative background material, i.e., discussions of plant growth conditions, harvesting methods, etc. Such chapter sub-titles as "Labor Situation" and "Middlemen and Marketing" are interesting features contributing to the thorough presentation.

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Chemical Industries

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Vol. 67, No. 6

DECEMBER 1950

The Business Magazine of the Chemical Process Industries

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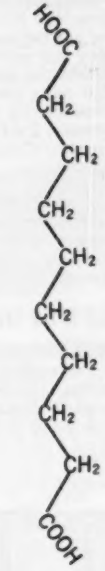

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THE READER WRITES

Another Producer of N-Bromosuccinimide?

To the Editor of Chemical Industries:

On page 384 of your September, 1950, issue is an article on the growing uses of N-Bromosuccinimide. The article mentions that National Aniline and Arapahoe are the producers.

Our company also now supplies this product in substantial quantities. Perhaps you could run a footnote to your above article mentioning this.

W. B. HENDREY, PH.D.
Delamar-Hendrey Chemical Co., Inc.
Chicago, Ill.

CI's article mentioned producers only. Reader Hendrey, however, says that his company now represents a "local producer who prefers to remain in the background."—Ed.

Reprints of Wax Article

To the Editor of Chemical Industries:

We would like to take this opportunity to compliment your publication and Dr. Charles J. Marsel on his excellent article entitled WAXES, TYPES, PRODUCTION, PROPERTIES, USES in the October issue of CHEMICAL INDUSTRIES.

The October issue was received this morning and by noon, this particular article has been read by four people in our organization, all of whom have commented very favorably on this article. This particular article has an excellent retainer value as well as reference value.

Are reprints available?

H. R. KOEHLER
George Senn, Inc.
Philadelphia, Pa.

CI's thanks to Reader Koehler for his kind comments. Reprints of the 12 page article on waxes are available at the following prices: Single copies, 50 cents each; 5 to 10 copies, 40 cents each; 11 to 25 copies, 35 cents each; 26 or more copies, 30 cents each.—Ed.

Petroleum Held Key to Benzene Future

To the Editor of Chemical Industries:

I have been particularly interested in the note you carried in the November Newsletter outlining the Munitions Board's plans for coping with the benzene shortage.

I believe there are several good, or at least promising, answers to the benzene problem. However, one result of the increased demands for benzene that have developed will probably be to move the price up substantially from the low levels of past years. These low price levels resulted from the fact that benzene has been simply a by-product of coke manufacture, that more of it was produced than was required for chemical manufacture, and the balance was blended with gasoline for use as motor fuel. It now seems likely that the value of benzene as a chemical raw material will determine its market value. This is all to the good.

Any amount of benzene which could conceivably be used by the chemical industry can be made from petroleum at costs only a little above former average benzene prices. We may expect many readjustments as a result of the fundamentally different benzene situation, which I believe is not just temporary.

I believe it is too early to predict very confidently just what new source of benzene supply will be the most important. The question is complicated by the fact that all of the processes for producing benzene, yield it as a minor product, as is likewise true for its production from coal by conventional coking, or in somewhat higher yields by other special methods. Of the newer processes under consideration for benzene production the catalytic "platforming" process seems particularly promising since the major product is high octane motor fuel.

BENJAMIN T. BROOKS
Consulting Chemist
New York City, New York

Consultant Brooks, author of many books and articles dealing with petroleum chemistry in particular, knows whereof he speaks. The benzene problem admits of no easy, clear-cut solution; but whatever approach to the ultimate solution is followed will, as Dr. Brooks points out, undoubtedly result in higher prices.—Ed.

Substitute Arsenite for Arsenate

To the Editor of Chemical Industries:

It has been brought to our attention that on Page 428 of your September 1950 issue of the CHEMICAL INDUSTRIES magazine you had an article dealing with some of the work we have done in chemical girdling trees for bark removal.

For your information, the chemical solution we have used was sodium arsenite and not sodium arsenate as given in your article.

S. L. BENNETT
Department Manager
Armstrong Forest Company

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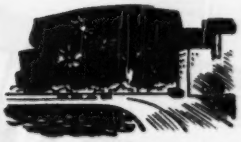

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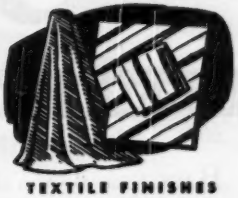

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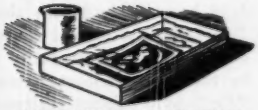

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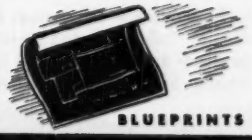

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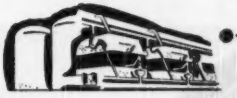

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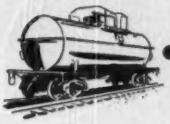

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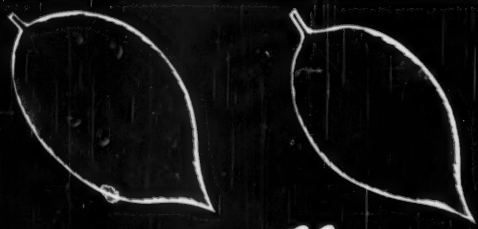

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Portland 9, Ore., 730 West Burnside St.	Beacon 1853	Atlanta 2, Ga., 140 Peachtree St.	CYpress 2821
Chicago 54, Ill., The Merchandise Mart	SUperior 7-3367	New Orleans 18, La., 714 Carondelet Building	Raymond 7229
Charlotte, 1 N.C., 201-203 West First St.	CHarlotte 3-8221	Toronto 2, Canada, 137-143 Wellington St. W.	Elgin 0493

RESINS

COUMARONE-INDENE

MODIFIED COUMARONE INDENE

ALKYLATED PHENOL

OXIDIZING

RESIN SOLUTIONS

COAL-TAR SOLVENTS

BENZOL

TOLUOL

XYLOL

HI-FLASH SOLVENT

COSOLS

52-N-1

PLASTICIZING OILS

CREOSOTE OILS

SHINGLE STAIN OILS

NEUTRAL OILS

TAR ACID OILS

PHENOTHIAZINE

TAR PAINTS

NEVILLE Chemicals

For The Nation's Vital Industries ★

Ask for new Price List

This new price list also gives description and characteristics of *Neville* quality products, designed to serve various industrial needs.

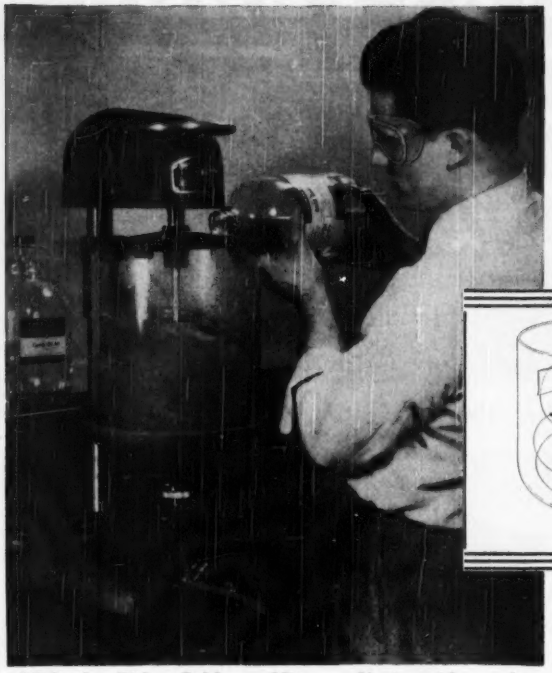
THE NEVILLE COMPANY

PITTSBURGH 25, PA.

A-34

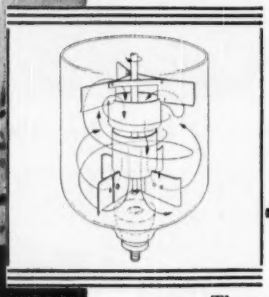
RAPID REACTIONS — BETTER [illegible]NG

with the NEW FISHER-GOLDMAN MIXER



With the Fisher-Goldman Mixer, sulfuric acid can be added to castor oil for sulfonation in one-tenth the time required with ordinary stirrers without any burning effect.

The Fisher-Goldman Mixer, complete with stand, jar, and base; price **$225.00.**



The arrows trace the fast, outward-upward-over-down movement of the mixture which produces exceptionally thorough blending.

The unique arrangement of stirrers and baffles of the Fisher-Goldman Mixer, manufactured by Fisher Scientific Co., produces an intimate intermingling of the batch components which is vastly more effective than ordinary stirring or mixing.

The capacity of up to three gallons of the Fisher-Goldman Mixer makes it useful for processing small batches as well as for laboratory and pilot plant operations. It is a completely new departure in mixing technique.

Write for complete information and specifications.

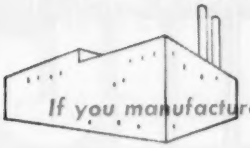
Headquarters for Laboratory Supplies

FISHER SCIENTIFIC CO.
717 Forbes St., **Pittsburgh (19), Pa.**
2109 Locust St., **St. Louis (3), Mo.**

EIMER & AMEND
Greenwich and Morton Streets
New York (14), New York

New Washington Plant: 7722 Woodbury Drive, Silver Spring, Maryland

EASTMAN triethyl phosphate



If you manufacture:	Investigate Eastman triethyl phosphate as a:
Water Paints Water Glues Textile Sizes	**PLASTICIZER**
Hydraulic Fluids Transformer Oils Lubricating Oils	**VISCOSITY MODIFIER**
Paint, Varnish, or Lacquer Removers	**PENETRATING AGENT**
Tetraethyl Pyrophosphate or Similar Insecticides and Rodenticides	**REACTANT**
Ethylated Amines, Alcohols or Phenols	**ETHYLATING AGENT** (All 3 ethyl groups are available)
Diolefins	**DEHYDRATING CATALYST** for Glycols and Olefinic Alcohols

Eastman triethyl phosphate is also useful as a specialty solvent and as a deicing fluid.

We will be pleased to send you detailed information and sample quantities of Eastman triethyl phosphate for your evaluation. Write to TENNESSEE EASTMAN CORPORATION (Subsidiary of Eastman Kodak Company), KINGSPORT, TENNESSEE.

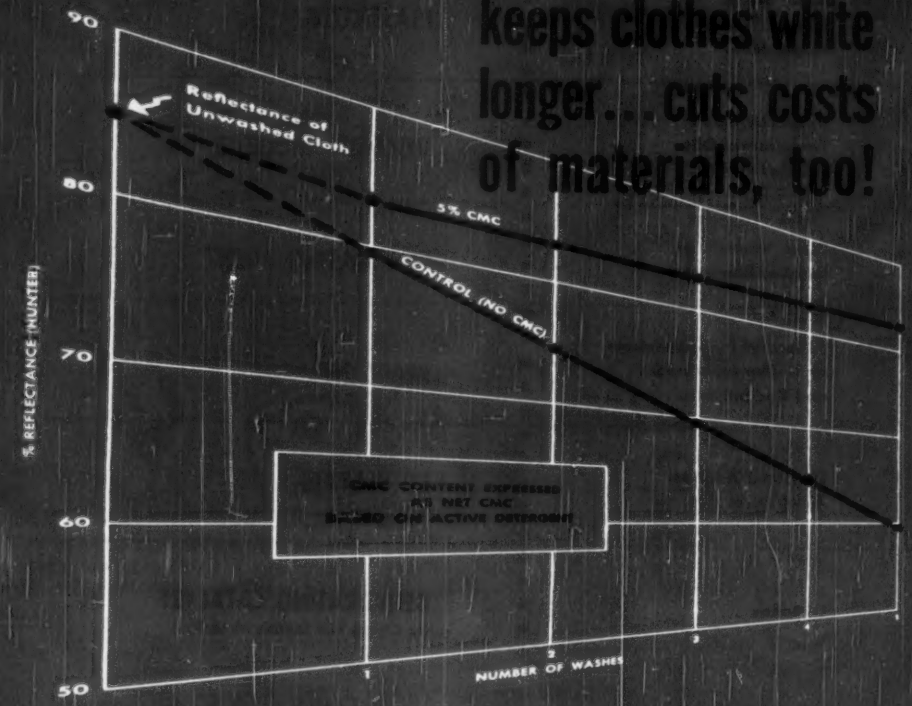
EASTMAN INDUSTRIAL CHEMICALS

SALES REPRESENTATIVES: New York—10 E. 40 St.; Cleveland—Terminal Tower Bldg.; Chicago—360 N. Michigan Ave. **West Coast: Wilson & Geo. Meyer & Co.,** San Francisco—333 Montgomery St.; Los Angeles—4800 District Blvd.; Portland—520 S. W. Sixth Ave.; Seattle—1020 Fourth Ave., So.

Crude Technical CMC

HERCULES®

keeps clothes white longer... cuts costs of materials, too!



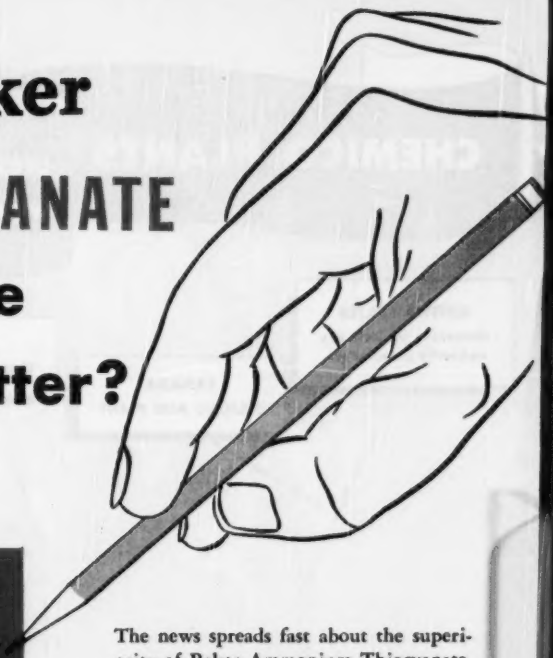
THIS chart proves that Hercules "CT" grade of CMC, especially prepared for detergents, will do a better job for your laundry customers—and at no extra cost to you! This grade of CMC reduces the amount of active detergent needed and permits the generous addition of cheaper alkaline builders.

In this case, the 5% replacement of the active detergent content with "Hercules" CMC ("CT" grade) increases soil removal and whiteness retention properties almost 45% even after five washings. And this greater whiteness is increasingly noticeable with each washing. We will be glad to work with you in adapting CMC to your detergent needs. A purified grade of CMC (cellulose gum) is also available.

HERCULES POWDER COMPANY 992 Market Street, Wilmington, Delaware

CM50-8

can these Baker AMMONIUM THIOCYANATE features make your product better?



Check for Yourself

- ✓ It is an all-synthetic product.
- ✓ It is colorless, clear, white—sparkling crystalline structure.
- ✓ It is readily soluble.
- ✓ This all-synthetic chemical is stable* at ordinary temperatures.
- ✓ Containers are fiber moisture-resistant drums, polyethylene lined, with friction cover tops to safeguard against atmospheric moisture.
- ✓ You have uniform quality and scheduled availability, for Baker controls all raw materials.
- ✓ It is packaged in convenient 200, 100, 50 and 25 pound fiber drums, polyethylene lined.

*Make up solutions should be kept in tightly closed containers.

The news spreads fast about the superiority of Baker Ammonium Thiocyanate, Technical Crystal.

Industry after industry investigated its seven features—made comparative tests—and decided that this *all-synthetic* Ammonium Thiocyanate (Sulfocyanate) had qualities that would, in turn, give *their* process or products superiority.

Whether you buy Ammonium Thiocyanate for textiles or textile printing, for adhesives, as an inhibiting agent, or for a hundred and one other uses, you owe it to yourself to check the Sulfocyanate you may be using with Baker (all-synthetic) Thiocyanate.

Check every one of the seven Baker features. See which ones may help your company—then ask for samples and prices.

The comparative tests will be your best guide to value.

Address: J. T. Baker Chemical Co., *Executive Offices and Plant,* Phillipsburg, N. J.

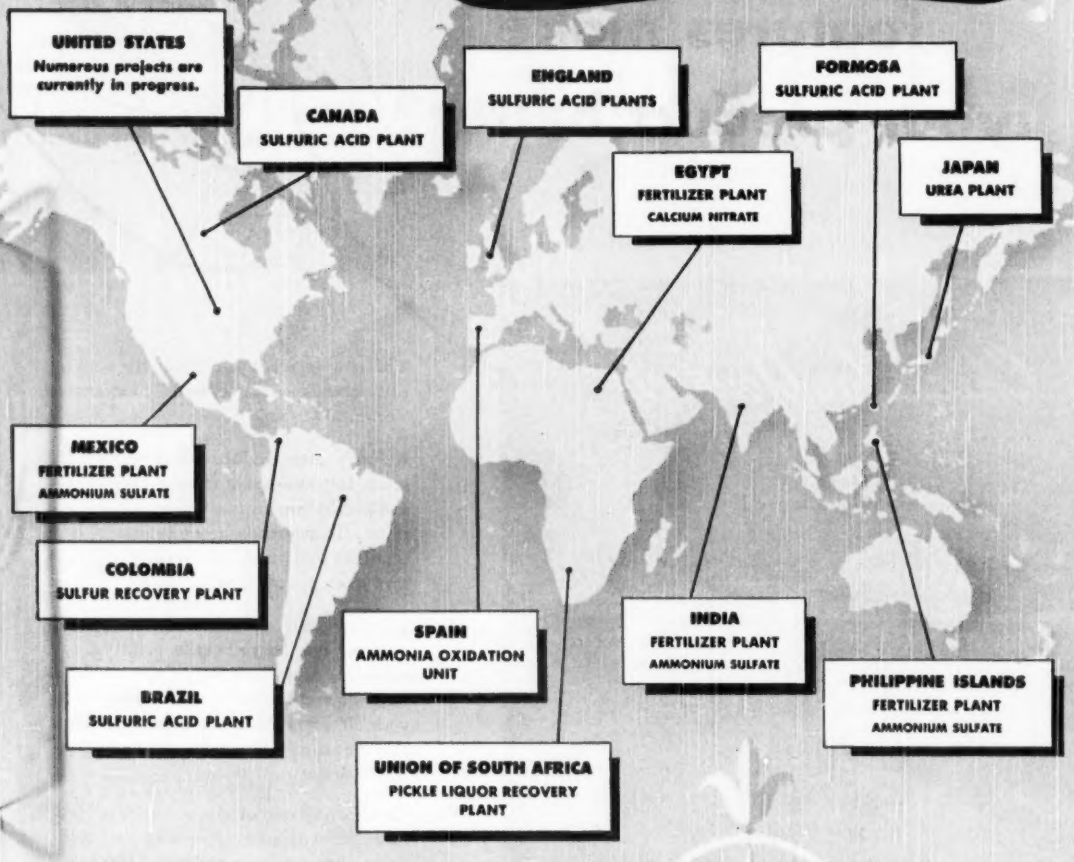
Baker CHEMICAL

Baker Chemicals

REAGENT • FINE • INDUSTRIAL

CHEMICO PLANTS

presently under construction in widely scattered countries of the world



All the projects pinpointed above are now under way. These are in addition to the more than 600 Chemico installations already completed during the past 36 years, many in countries not mentioned above.

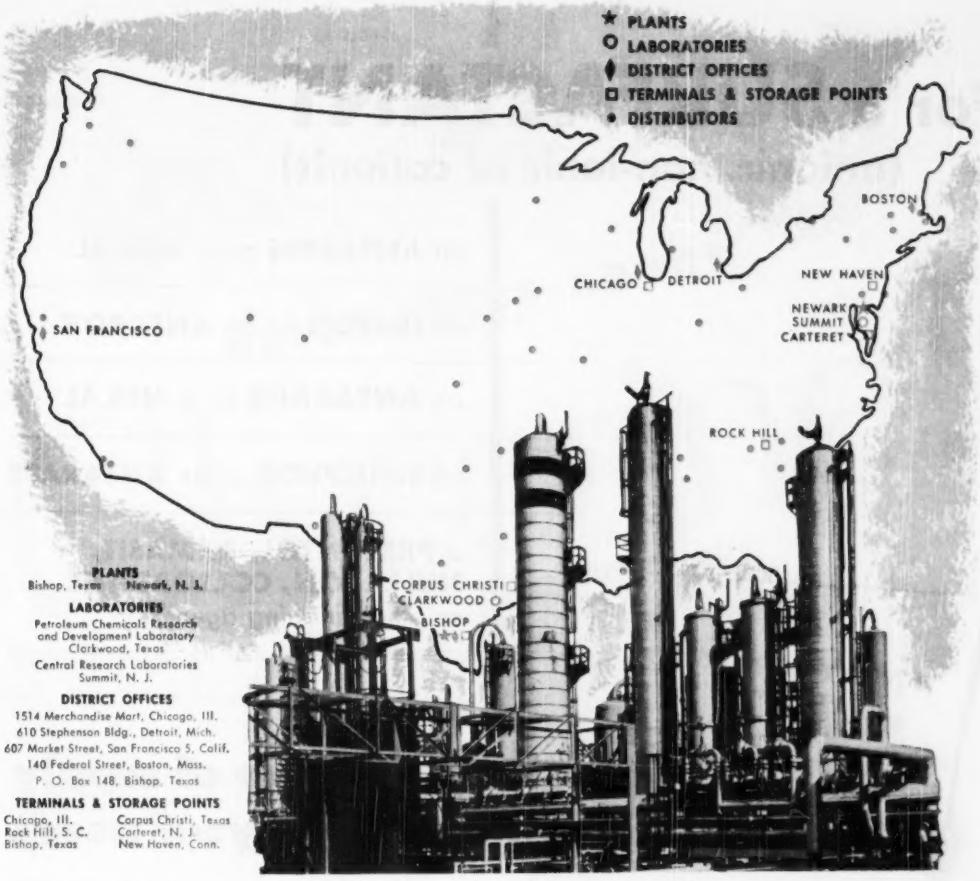
CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

488 MADISON AVENUE, NEW YORK 22, N. Y.

EUROPEAN TECHNICAL REPRESENTATIVE: CYANAMID PRODUCTS, LTD., LONDON W. C. 2, ENGLAND
EUROPEAN LICENSEE OF N. E. C. PROCESS: HYDRO-NITRO S. A., 8 QUAI DU CHEVAL BLANC, GENEVA, SWITZERLAND
CABLES: CHEMICONST, NEW YORK

Chemico plants are profitable investments



THE CELANESE CHEMICAL PLANT

IS AT YOUR FRONT DOOR

Each year, an increasing number of industries *look to Celanese* for their volume organic chemicals. The modern Celanese plant—incorporating the most advanced equipment and processes—offers a five-fold chemical service that includes:

- **Organic chemicals in dependable volume supply**
- **A nationwide distribution service**
- **Bulk storage facilities at strategic locations**
- **Research that parallels your interests**
- **Technical service and guidance**

The greater part of all Celanese* chemicals are produced by oxidation of petroleum natural gases. The Celanese Chemcel plant, near Bishop, Texas, is located in the heart of abundant raw material supplies . . . assures a continuity of production.

Celanese laboratories, with a background of a generation of research in petroleum chemistry, are ready to give valuable technical assistance and development help. Write now, for brochure.

Celanese Corporation of America, Chemical Division, Dept. 52-L, 180 Madison Ave., New York 16, N.Y.

Celanese ✻
CHEMICALS

*Reg. U. S. Pat. Off.

FORMALDEHYDE • PARAFORMALDEHYDE • ACETIC ACID • ACETALDEHYDE • ACETONE • METHANOL • n-PROPANOL METHYLAL • PROPYLENE GLYCOL • DI-PROPYLENE GLYCOL • PROPYLENE OXIDE • BUTYL ALCOHOLS • TRICRESYL PHOSPHATE

For a SURFACTANT
(anionic, non-ionic or cationic)

an **ANTARON** or an **IGEPAL**

an **IGEPON** or an **ANTAROX**

an **ANTARANE** or a **NEKAL**

an **EMULPHOR** or an **ANTARATE**

a **PREVENTOL, RAMASIT, NULLAPON, COLLORESINE** *or other finishing agents*

...one source of supply now serves all your needs

More than 30 major industries need one or more of the types of products suggested in the brief listing above. Now all are available from one source. One of these may make your product *easier to sell* or *less expensive to manufacture*.

As of October 1, 1950, Antara Products—General Aniline & Film Corporation was merged with the Organic Chemicals Division of General Dyestuff Corporation.

The new *Antara Products Division of General Dyestuff Corporation*, thus formed, will coordinate and handle the sales and services of all chemicals, intermediates, and allied products made by the General Aniline & Film Corporation.

Extensive research staffs and facilities support the development and application of all Antara Products—available to work with you in the improvement of an existing product or the development of a new one. Your inquiry is invited—without obligation. It will bring a prompt opinion as to whether one of the Antara Products may be adaptable to your needs. Kindly address your inquiry to Department 66.

NOTE: The Dyestuff Division of General Dyestuff Corporation will continue to operate as before, without change in personnel or policy.

ANTARA® PRODUCTS

DIVISION OF

GENERAL DYESTUFF CORPORATION

435 HUDSON STREET • NEW YORK 14, NEW YORK

BRANCHES

Boston • Providence • Philadelphia • Charlotte, N. C. • Chicago • Portland, Ore. • San Francisco • Oakland

In Canada: **Chemical Developments of Canada Limited, Leaside, Toronto 17**

—In textiles

—In foods

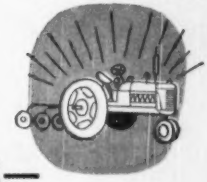
—In cosmetics

QUICK FACTS ABOUT

Glycerine!

—In drugs

—In protective coatings



5 free booklets—

review Glycerine applications across a wide range of industry. Here's up-to-date information on the role Glycerine plays in your business . . . and a wealth of technical data besides!

All five contain pertinent information on the physical and chemical properties of Glycerine . . . its origin and development . . . grades and their applications, as well as a number of comprehensive tables and graphs.

Compiled by the Glycerine Producers' Association and edited by technical consultants, these easy-to-read booklets are designed to aid the production man as well as the research technician. Check the titles in which you're interested and mail the coupon TODAY!

Glycerine Producers' Association, 295 Madison Avenue, New York 17, N. Y.

Please send copies of these Glycerine booklets

3

- ☐ Why Glycerine? (a general survey of all main uses)
- ☐ Why Glycerine for Alkyd Resins and Ester Gums?
- ☐ Why Glycerine for Drugs and Cosmetics?
- ☐ Why Glycerine for Foods?
- ☐ Why Glycerine for Textiles?

Name_____

Title_____

Company_____

Address_____

City_____ Zone____ State_____

HOW TO DROP $10,000.00

and not lose a cent

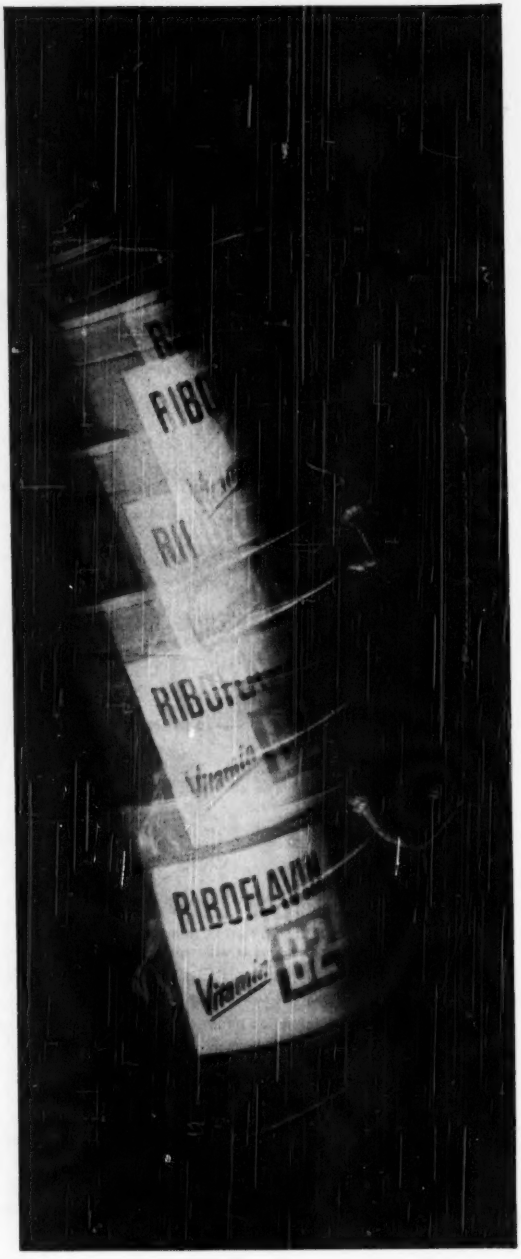
If you shipped riboflavin—a widely used vitamin—the very thought of somebody dropping one of your shipping drums would give you gray hairs. A single drum of riboflavin is worth upwards of $10,000. But one of Continental's regular line of shipping drums—the Leverpak drum—is the choice of many companies for safeguarding their most valuable products.

The stroboscopic photograph at the right shows a Leverpak drum containing four hundred pounds dropping four feet. It didn't leak, shatter or fracture. *Not a penny's worth of the contents will be lost!*

This Leverpak drum is just one example of Continental's ability to develop packages to meet exacting requirements. Like all Continental drums, it is light in weight to save shipping costs, and can be furnished in a wide variety of linings and coatings.

Whatever your product, Continental can supply you with a package that will stand up in service, stand out in appearance. Continental is famous for its fine lithography and decorative work. Drum, can, or paper container—if you have a packaging problem, our technical staff is ready to help you solve it. Continental is big enough and flexible enough to handle any packaging situation.

DRESS UP YOUR PRODUCT WITH A CONTINENTAL DRUM. Three types to choose from. The Leverpak drum, with its unique lever-locking device, for maximum protection under hard usage. 12- to 75-gallon sizes. . . . .The Fiberpak drum—a rigid, light, all-fibre container in ¾- to 67-gallon sizes. . . . .The Stapak drum with fibre body and metal top and bottom. Supplied in 2- to 32-gallon sizes.



CONTINENTAL CAN COMPANY

FIBRE DRUM DIVISION • VAN WERT, OHIO

New York • Philadelphia • Pittsburgh • Tonawanda • Cleveland
Chicago • St. Louis • Los Angeles • San Francisco • Eau Claire

4 good reasons why you should use **D-40 detergent**

FOR WETTING, FOAMING, CLEANING AND COMPOUNDING

ORONITE CHEMICAL COMPANY

Reg. U.S. Pat. Off.

THE NAME TO WATCH IN CHEMICALS

OTHER ORONITE PRODUCTS:

Polybutenes • Cresylic Acids
Naphthenic Acids
Sodium Sulfonates
Purified Sulfonate
Phthalic Anhydride
Gas Odorants
Wetting Agents
Ortho, Para Xylene
Xylol
Lubricating Oil Additives
Aliphatic Acid
Hydroformer Catalyst

D-40 has superior *cleaning action* and really gets the dirt, yet D-40 is neutral and will not harm the finest fabrics.

D-40 has fast *wetting and penetrating* action and its remarkable stability over a wide range of pH conditions have proven helpful in a variety of industrial applications, from fruit washing to dye leveling.

D-40 provides abundant *foam* and will add "life" to any compound, yet for special purposes, the foam can easily be eliminated.

D-40 in new whiter color, designed to suit any industrial, compounding or repackaging requirement, is now available in three particle sizes: flakes—granules—powder.

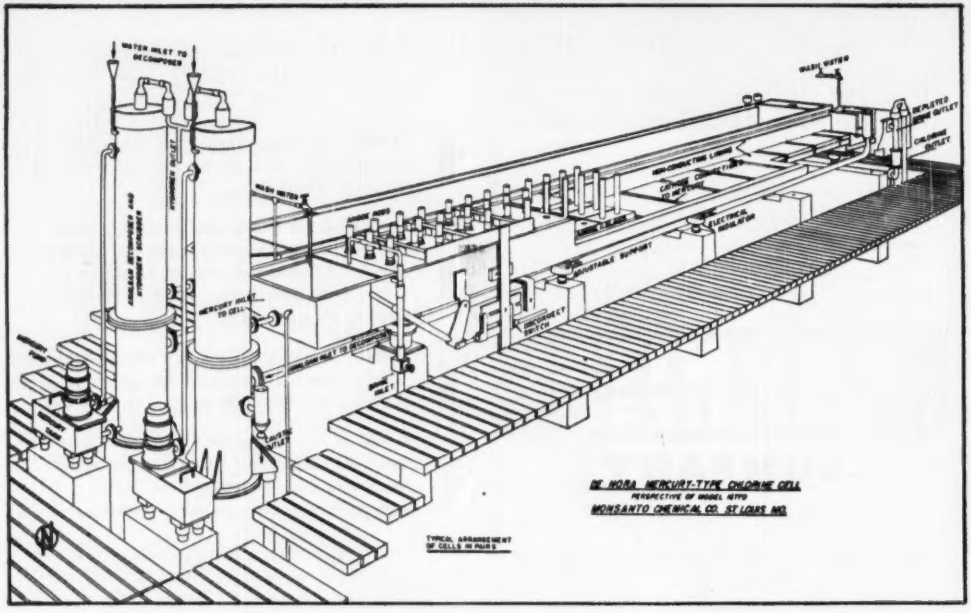
Oronite's Detergent Raw Materials are available in forms to fit the requirements and resources of all possible users. (1) *Detergent Alkane*, a clear, water-white alkyl aromatic hydrocarbon. Available to primary manufacturers of quality detergent products as a base stock for sulfonation. (2) *Detergent Slurry*, the sulfonated derivative of Alkane. A paste-like product for use in many cleaning applications or as a base for further compounding and drying. (3) *Dry Detergents D-40 and D-60*, the dry products from Oronite Detergent Slurry.
Ask for complete technical information from your nearest Oronite office.

ORONITE CHEMICAL COMPANY

30 SANSOME ST., SAN FRANCISCO 4, CALIF.
STANDARD OIL BLDG., LOS ANGELES 15, CALIF.
30 ROCKEFELLER PLAZA, NEW YORK 20, N. Y.
400 S. MICHIGAN AVENUE, CHICAGO 5, ILL.
814 WHITNEY BLDG., NEW ORLEANS 12, LA.

For Your Information

Every month Monsanto publishes three pages of pertinent information. Here you will find suggestions and application ideas selected to help you improve your products, lower your production costs, increase your sales. More information will gladly be furnished on requests.



Have You Investigated the Monsanto Electrolytic Chlorine Process?

QUICK FACTS ABOUT THIS PROCESS:

1) Simultaneous production of rayon-grade caustic up to 73% without evaporators or purification.

2) All or part of the caustic production may be replaced by production of sodium sulfide or various other products.

3) Uses the De Nora mercury-type cell which has been employed commercially for fourteen years. Of all mercury-type cells, it is the most rugged and compact. It requires minimum maintenance and a minimum amount of floor space.

If you would like to know more about the Monsanto Electrolytic Chlorine Process write or wire Monsanto Chemical Company, Engineering Sales Department, 1700 South Second St., St. Louis 4, Missouri.

Mail coupon for bulletin on Monsanto Plasticizers

If you manufacture polyvinyl chloride film and sheeting, you will find Monsanto Technical Bulletin No. O-70 interesting and profitable reading. The 11-page bulletin gives the properties and uses of typical formulations, detailed information on various plasticizers and their functions and the composition and relative values of seven stabilizer systems. For your free copy of Technical Bulletin No. O-70, "Monsanto Plasticizers in Polyvinyl Chloride Film and Sheeting," indicate your wishes on the coupon and mail it to Monsanto.

Application research expanded at Monsanto

Monsanto's research in the application of chemicals to other industries has been expanded with the creation of a special section in the Organic Division Research Department to carry on such work. Present application research deals with plasticizers, agricultural chemicals and oil additives. In the future, projects will be handled in all fields served by the hundreds of Monsanto Chemicals.

Monsanto's nontoxic plasticizers have many uses and possibilities

The development of nontoxic plasticizers has opened new horizons for plastic products, including coatings, adhesives, films, sheeting, extrusion articles and molded items. In the Monsanto line of plasticizers, all of which are in limited supply, are three Santicizers that have been accepted as nontoxic by the Bureau of Animal Industry of the United States Department of Agriculture. These nontoxic plasticizers are Santicizer® 141, Santicizer B-16 and Santicizer E-15.

The list of applications of these Santicizers may suggest uses helpful in your business. If, after reading the list, you want further information, mail the coupon or contact the nearest Monsanto Sales Office.

Applications of nontoxic plasticizers include:

COATINGS

Paper—Greaseproof coatings for doughnut packages, ice cream cartons, paper plates, cap linings for beverage bottles.

Metal—Can linings.

Cloth—Upholstery or other fabric applications where skin contact may result in irritation.

ADHESIVES

Paper—For fabricating leakproof containers such as milk cartons, orange drink bottles and similar products.

Metal—Can-sealing compounds for containers such as lard cans.

FILMS AND SHEETING

Plasticized Film Packaging—For packaging such items as fresh meat, frozen meat, prepared and cured meat, poultry, cheese (both natural and processed), butter, margarine, lard and shortening, candy, vegetables and fruits (both fresh and dried), bulk produce (such as apples, cranberries, potatoes, grapes), staples (such as flour).

Nonirritating Items—Baby pants, hospital sheeting, household scrub gloves.

EXTRUSION ARTICLES

Tubing—Venoclysis (blood transfusion) tubing, milk and beer tubing.

MOLDED ARTICLES

Prosthetic Devices—Artificial ears, fingers, etc., gum dentures, nontoxic sponges.

Try Sterox CD—low-sudsing, 100%-active, nonionic, synthetic detergent and wetting agent

Take a look at Monsanto Sterox® CD when your industrial processes call for a low-sudsing, 100%-active detergent or wetting agent or when you are developing detergent mixtures for home or commercial use. If you want to try Sterox CD in your laboratory, we'll be glad to send you a sample and answer any questions that you may have.

Sterox CD is a pale-yellow to light-amber liquid with a mild odor that is not objectionable but which can be perfumed easily if desired. At room temperature, Sterox CD is of medium viscosity, having a pour point of approximately 50° F. It is miscible with water in all proportions at room temperature.

Sterox CD is efficient in hard or soft water. It is compatible with synthetic detergents and soaps. It frequently is advantageous to add Sterox CD to anionic detergents. Sterox CD is compatible with cationic-type detergents and gains increased efficiency when combined with such builders as phosphates, silicates and carbonates. It is used effectively with acid-type cleaners.

The addition of small amounts of Sterox CD to dry detergent mixtures will substantially reduce dusting during the mixing operation and in the finished product.

For complete data and a sample for use in your laboratory, mail the coupon or contact the nearest Monsanto Sales Office.

New isocyanate

Ethyl isocyanate has been added to the extensive line of isocyanates available from Monsanto. Isocyanates are used in adhesives, paint, rubber, plastics and textiles. Mail the coupon for data.

Santomerse No. 1... all-purpose detergent and wetting agent

Santomerse® No. 1 is the all-purpose detergent and wetting agent. It is a versatile servant that disperses, wets, emulsifies, penetrates, and is high in detergency. As a detergent, Santomerse No. 1 has the ability to lift out particles of grime and grease and hold them in suspension so they can be carried away in the rinse. Effective in hard or soft, hot or cold water and in alkaline, neutral or acid solutions, Santomerse No. 1 does not form insoluble soap curds, which are detrimental to industries such as textile manufacturing.

AROCLORS put "protection" in protective coatings

Used as plasticizers or resins by many leading manufacturers of modified and synthetic rubber protective coatings, Monsanto Aroclors deliver greater toughness and adhesion . . . stronger resistance to corrosion, flame, water and weather . . . greater resistance to acids and alkalies. There probably is an Aroclor® you can use in your paints. Mail the coupon for details.

☆ ☆ ☆

MONSANTO CHEMICAL COMPANY, 1703-M South Second Street, St. Louis 4, Missouri. District Sales Offices: Birmingham, Boston, Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Los Angeles, New York, Philadelphia, Portland, Ore., San Francisco, Seattle. In Canada, Monsanto (Canada) Ltd., Montreal.

*Reg. U. S. Pat. Off.

Monsanto Intermediates

The following intermediates are available from Monsanto:

Dinitroaniline	Orthochlorophenol
Metachloraniline	Orthonitrobiphenyl
Methyl Para Toluenesulfonate	Orthoaminobiphenyl
Monsanto Salt	Parachloraniline
Orthochloraniline	Toluenesulfonic Acid

Limited supplies are available on certain other Monsanto Intermediates and prompt shipment may or may not be possible. If you need any of the following intermediates, contact the nearest Monsanto Sales Office for the latest information on availability:

Benzoic Acid	Phosphorus Trichloride
Benzyl Chloride	Salicylic Acid Technical
Parachlorophenol	Dinitrochlorobenzene
Paranitrochlorobenzene	Orthoanisidine
Paraphenetidin	Orthonitraniline
Paratoluenesulfonchloride	Orthophenetidin
Paratoluenesulfonamid	Paranisidine
Phenol	Cyclohexylamine
Phosphorus Oxychloride	

MONSANTO
CHEMICALS — PLASTICS

SERVING INDUSTRY... WHICH SERVES MANKIND

SEND INFORMATION: ☐ Nontoxic Plasticizers. ☐ Isocyanates. ☐ Sterox CD. ☐ Aroclors.

SEND LITERATURE: ☐ Santomerse No. 1. ☐ De Nora Mercury Cell. ☐ Technical Bulletin O-70.

SEND SAMPLE: ☐ Sterox CD.

MONSANTO CHEMICAL COMPANY
1703-M South Second Street, St. Louis 4, Missouri

Please send, without cost or obligation, material indicated at the left.

Name.....Title.....

Company.....

Street.....

City.....Zone.....State.....

Attention...

LARGE & SMALL MANUFACTURERS:

don't sell your drums at ANY PRICE

SPECULATORS - EXPORTERS - SCRAP DEALERS

want your STEEL DRUMS

Prepare for...avoid... STEEL DRUM SHORTAGE !

We will retain your steel drums for your own needs. Allocations and restrictive orders are coming. Don't waste steel drums . . .

SHIP CARLOADS FROM EAST of MISSISSIPPI only *freight collect*

REMEMBER:
Government and Military needs come *first!*

RETURN ALL EMPTY STEEL DRUMS TO.....

Regardless of condition or previous contents

You may also return deposit drums.

no storage charges

We'll guarantee credit from your supplier for full amount of deposit charged.

Your drums will be retained for YOUR ACCOUNT

Your drums will be returned to your raw materials suppliers after re-conditioning.

(YOUR RAILROAD)

Consigned to: GENERAL DRUM TERMINAL
Destination: LINDEN, N. J.
Delivery Carrier: PENNSYLVANIA R. R.

200/300	Used Empty Steel Drums			
	16 & 18 Gauge	Min.		

SHIP TO: **GENERAL DRUM TERMINAL** PENNSYLVANIA R. R. LINDEN, N. J.

A non-profit Terminal, created by the largest steel drum organization in the world . . . . for the purpose of conserving steel drums during the emergency

ACME STEEL DRUM CO. *Newark, N. J.*

NEWARK STEEL DRUM CO. *Linden, N. J.*

Send a complete memorandum billing for shipments to:
Accounting Dept., GENERAL DRUM TERMINAL, P. O. Box 192, Linden, N. J.

Bonded acknowledgment & warehouse receipt will be mailed on receipt of your shipment.

references:

FEDERAL Trust Co. Newark, N. J.

LINDEN Trust Co. Linden, N. J.

CENTRAL Home Trust Elizabeth, N. J.

FIDELITY Union Trust Newark, N. J.

PHONE: Linden 2-4466

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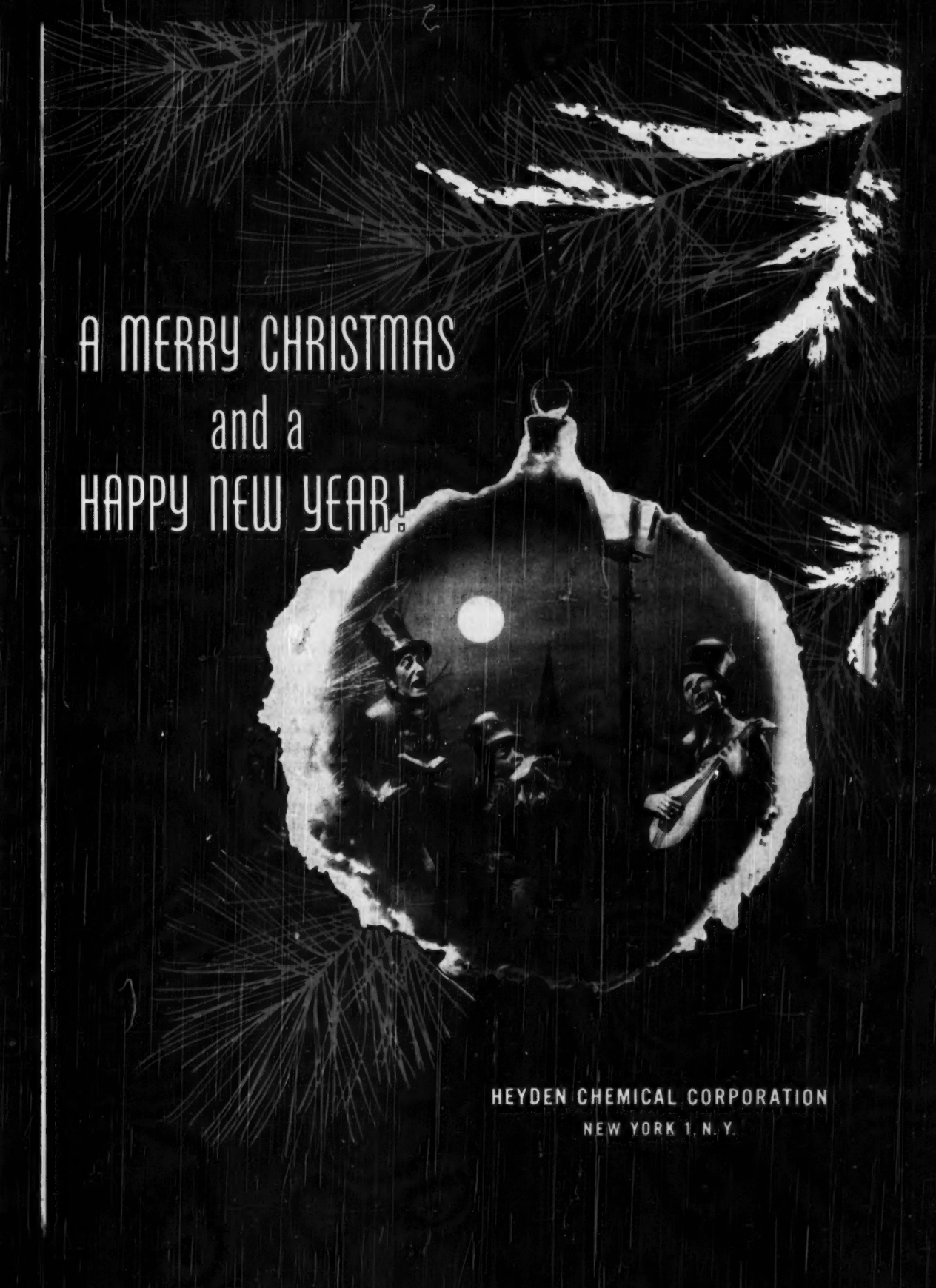
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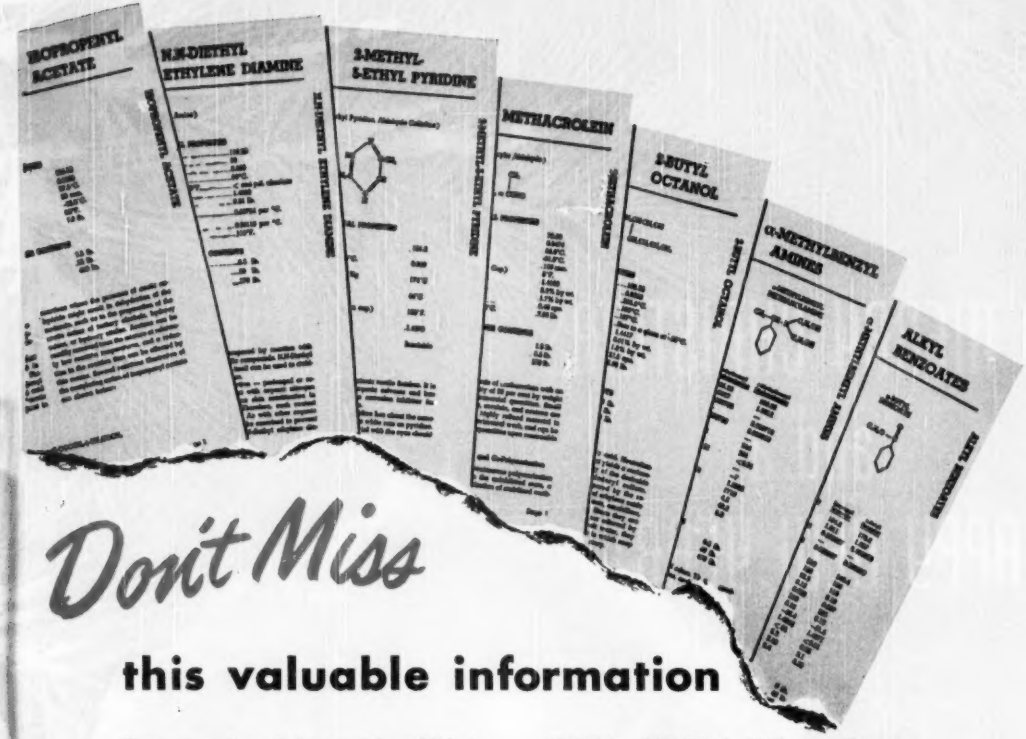

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this valuable information

Here are a few of the recently published technical bulletins on new organic chemicals developed by Carbide and Carbon Chemicals. Each of these bulletins contains helpful data and indications of uses that are potentially profitable to you. These technical bulletins should be a part of your permanent file on organic chemicals. If you have not received copies of all these bulletins, why not fill in the coupon below?

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D-12

Chemical Industries

THE BUSINESS MAGAZINE OF THE CHEMICAL PROCESS INDUSTRIES

Newsletter,
December, 1950

Thorny problems in transfer of technological know-how to friendly foreign nations will be examined by the newly formed Advisory Committee on Production Information. Organizer of the Committee, which will advise the State Department, is John Green, Office of Technical Services head.

Chemical industry representative is Frank Curtis, Monsanto vice-president and director, now working full time on industrial mobilization.

Three major problems will be considered: How to prevent secret data from trickling behind the Iron Curtain; prevention of financial loss—possibly by government indemnification—to private firms as a result of sharing know-how with allies; and prevention of anti-trust action against companies entering into agreements to transfer know-how to North Atlantic pact countries.

Government spokesmen concede that chemical firms may lose some overseas business by making their technology available, but they point out that if we don't strengthen those countries by sharing our production knowledge, there won't be any foreign business for American firms in any case.

* * CI * *

The U. S. Department of Agriculture's Production and Marketing Administration is working up a "master plan for insecticide requirements" for the coming year. Melvin Goldberg, assistant chief of WPB's Insecticide Division during the last war and currently a private consultant (Pesticide Advisory Service) will advise the PMA on collection of information on pesticide needs.

Titanium metal, highly useful but very expensive, may get a healthy boost from military planners who want to use more of the light, strong metal that is 140 times more resistant to sea-water corrosion than current steel alloys. Hitch is its price: $5/lb. for sponge metal, $15/lb. for forgings.

Three companies account for all domestic production: Metal Hydrides, Inc.; Remcru, Inc. (jointly owned by Du Pont's Remington Arms and Crucible Steel); and Titanium Metals Corp. (jointly owned by National Lead and Allegheny-Ludlum). One producer predicts an output of 100,000 tons a year within the next decade, even if the price does not fall below $2.50/lb. for sponge.

Government incentive to expansion of output may take the form of cost-plus defense contracts or permission of five-year write-off on new plants.

* * CI * *

More synthetic glycerine to relieve the current shortage is promised by a capacity increase at Shell Chemical Co.'s plant at Deer Park, Texas. Output will be upped by modifications of the present plant. Shell's present chlo-

rine supplier, Diamond Alkali Co., is increasing its production of chlorine and caustic soda to take care of requirements for the additional glycerine. A large user predicts an annual 22-million-lb. glycerine deficit before long.

First large installation (30,000 amp.) in North America of De Nora mercury-type chlorine cells will be put in at the Ontario plant of Marathon Paper Mills of Canada, Ltd. Production will be 25 tons of chlorine a day.

Designed by Monsanto (selling agent for De Nora) and built by Leonard Construction Co., the unit will produce chlorine, rayon-grade caustic, electrolytic sodium sulfide, sodium hypochlorite, and hydrochloric acid.

More capacity for Silene (magnesium silicate) rubber pigments is being built by Columbia Chemical Division of Pittsburgh Plate Glass Co. at its Barberton, Ohio, plant. Completion of the unit is expected by next fall.

* * CI * *

Defense requirements for nonflammable materials of construction have rekindled strong interest in Victor Chemical Works's diallyl phenyl phosphonate, which polymerizes to a flameproof plastic (CI, July 1947, p. 40). A pilot plant has just started operating. The polymer, called Phoresin, will probably be used as a laminating resin for such materials as glass fibers.

Alox Corp. is working on a replacement for blown rapeseed oil, which is used in special lubricants for machinery operating in the presence of water (marine engines, laundries, tanneries, food plants, etc.). Called Alox L-1639 in the laboratory, the material may be sold under that name. A solid synthetic ester melting at about 100 degrees F, the product blends with mineral oil. It will be sold to lubricant manufacturers for formulation into finished products.

Alox, incidentally, is expanding its laberatory research facilities.

* * CI * *

Sales area for Cheer, Procter & Gamble's new heavy-duty detergent that was first test-marketed in Kansas City a few months ago, is now being expanded. Among new areas where it is being sold: Buffalo and Niagara Falls.

Formulation differs from that of Tide, P & G's companion product. Tide contains both alkylaryl sulfonate and sulfated fatty alcohol, adding up to about 20% active material. Cheer contains no sulfated alcohol, contains about 27% active material made up of alkylaryl sulfonate and a foam builder.

Principal cause for the current tight position of oxalic acid: growing use of automobile radiator cleaning compounds based on the chemical.

Habit of cleaning radiators became ingrained during the war, when car owners had to keep the old buggy in shape "for the duration." Now, with more cars on the road than ever, this outlet claims 20% of oxalic production.

* * CI * *

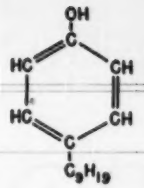
Here and There:

The Simoniz Co.'s new automobile polish, Bodygard, is still being test-marketed under various names in three areas. Called the "New Liquid Simoniz" and developed to meet the stiff competition of the newer silicone polishes, the product is being tested for possible national distribution.

More competition for American exporters: Dutch producers are now turning out more benzene hexachloride than is needed for domestic consumption.

The Editors

Nonyl Phenol



One of Koppers series of Alkylated Phenols

Koppers has added Nonyl Phenol to its series of alkylated phenols, and now offers it to the chemical industry in commercial quantities. Nonyl Phenol is a slightly viscous, yellow to tan liquid. It is only very slightly soluble in water, but is miscible with common organic solvents.

REACTIONS

Two of the three normally reactive nuclear positions are unsubstituted in this alkylated phenol, and are subject to reactions such as acylation, sulfonation, nitration, alkylation, and condensation with aldehydes.

The unhindered phenolic hydroxyl group undergoes such reactions as etherification, esterification, vinylation, ethylene oxide condensation, and formation of nonyl phenoxyacetic acid.

USEFUL APPLICATIONS

The physical properties of Nonyl Phenol indicate that it will be useful for the production of modified phenolic resins, non-ionic surface active agents, lubricating oil additives, antioxidants, plasticizers and agricultural chemicals.

PHYSICAL PROPERTIES

Boiling Range	**290°—300°C.**
Hydroxyl Number (theory 255)	**250**
Specific Gravity, 30°C.	**.940-.944**
Refractive Index, 20°C.	**1.5118**

Research and development chemists may obtain further information and experimental samples of Nonyl Phenol by writing to Koppers Company, Inc., Chemical Division, Dept. CI-12, Pittsburgh 19, Pa.

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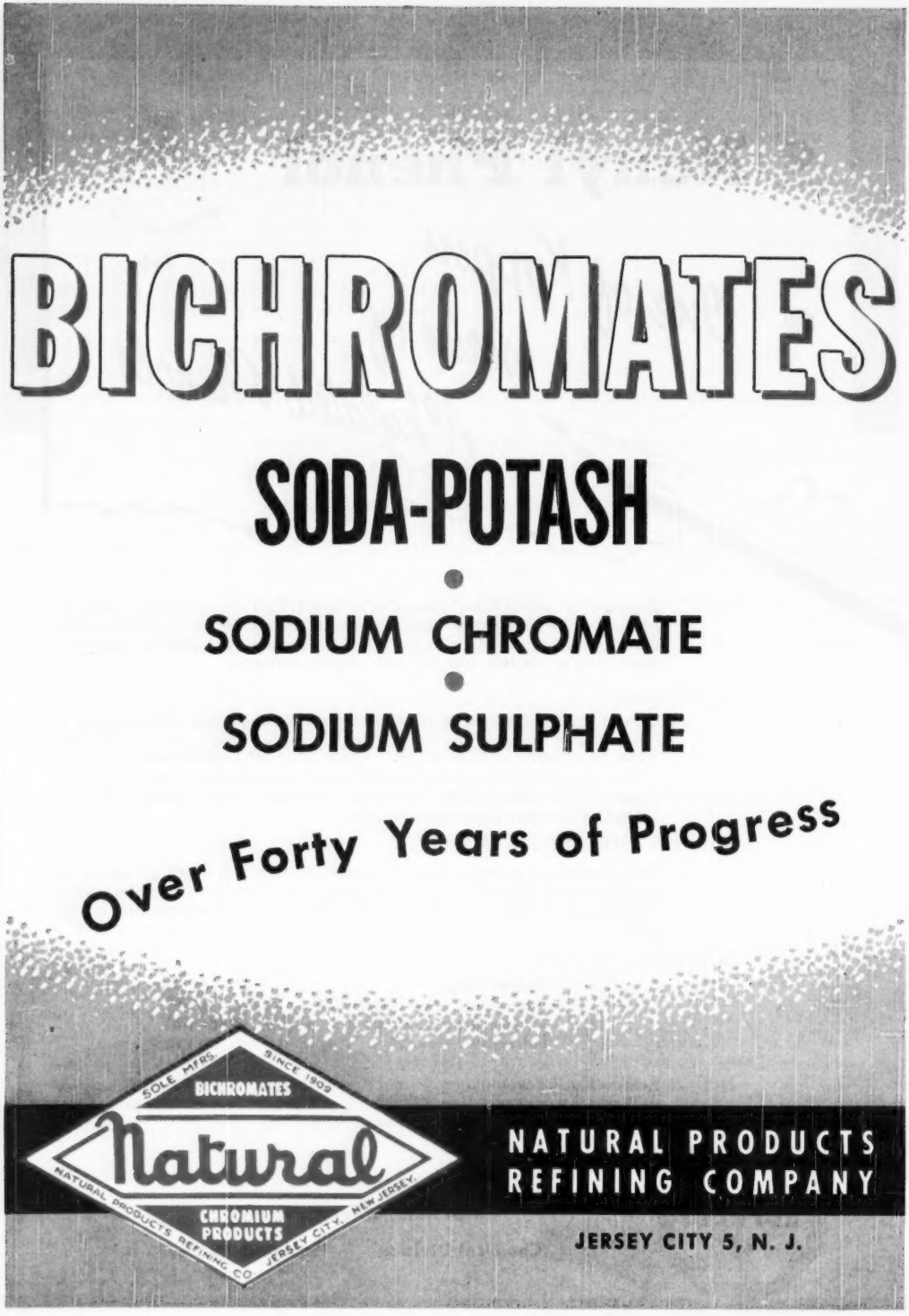
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AN IMMINENT CRISIS

by W. ALEC JORDAN, Editor

CRISIS IS A BRUTAL, FRIGHTENING WORD. But it is the only word which can be used to describe—even mildly—the labor shortage which our industry will face next year. Its seriousness, its imminence have not been felt yet. But they will be in a matter of months. Recognition *now* of the impending situation, coupled with intelligent planning by management, can mean the difference between successful operation of any chemical enterprise and floundering along with crippled production facilities.

This is the background: Last February there were 4,700,000 unemployed workers in the U. S. By October this labor pool had been cut to 1,900,000—well nigh the minimum figure because there must always be some "unemployed": seasonal workers, those changing jobs, those basically unemployable.

This sharp reduction in the number of workers available for employment was not, in the main, caused by the impetus of war. Even before Korea the U. S. was on the verge of an industrial boom, largely as a result of new plants and plant expansions. The manpower supply was beginning to tighten even when output demands were only those of a normal civilian economy.

Soon, however, defense needs are going to be superimposed on civilian needs. Now being drafted in Washington is a $20-$22 billion defense program.

Taking the consensus of all estimates, official and otherwise, the natural growth of the nation's labor force will yield, by next June, 2,780,000 new workers. Customarily, that would be a clear gain. Next year, however, the military and defense industry will have to have a minimum of 3,800,000 men. There's a clear deficit of over a million workers, and that doesn't consider the possibility of war—of all-out mobilization; just the pushing through of our planned "defense program."

More plants, greater production, less manpower. A critical labor situation is inevitable. When it will become acute is open to debate. It may be next June, or September, or December. But it will be next year. By all portents, it will make the 1941-1945 woes look pale by comparison.

Nonetheless, we are favored with one advantage, and only one: In the early 1940's there was little time to prepare, little time to plan for labor shortages. Currently, we can anticipate, can draft policies to obtain, train and keep workers. And we can capitalize upon past experience. Clearly, such projects should have top priority and the close attention of management.

These are a few points that might well be considered, *now:* There is always a greater dearth of skilled workers than there is of "labor." Examination of production procedures to determine if they can be simplified or further mechanized, would be advisable—would mean that a greater proportion of semi-skilled help might be utilized.

Are there inequities in your wage and salary structures? Are jobs, and pay rates, clearly categorized? Are salary or wage increases based on a definable, logical procedure or are they haphazard, unorganized? (If a wage "freeze" order comes through, and it is not unlikely, a company which lacks a defined and defensible wage policy may have one imposed upon it—one which might be unfair to the company, prevent its competing on an equal basis for workers.)

Should your physical standards for employees be revised with an eye to the possible employment of older men? Should you reconsider policy matters such as the hiring of relatives of employees?

Would it be worthwhile to consider the use of labor scouts, to chart the area from which you can expect to draw workers? (Possibly, the setting up of transportation facilities would enable you to tap a larger labor pool.) Perhaps, too, decentralization of labor recruiting would be advantageous—opening convenient downtown employment offices. How is your relationship with State employment agencies, with your *local* Selective Service Board?

Do your employment application blanks yield the type of information you really need or are they cluttered, useless? Mayhap a simple redrafting would make them a true resource file.

Are you capitalizing on training programs? "Up-one-notch" plans are fruitful, insure that every key man has an understudy.

There is time, and but little time, to plan and act. And action will pay robust dividends.

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4. **Diamines**—(a) reduction of nitroamines (see above), and (b) reduction of dinitroparaffins made by condensing nitroparaffins with ketones, or reacting chloronitroparaffins with alkali salt of an NP.
5. **Cyclic Nitroalcohols**—condensing primary nitroparaffins with cyclohexanone.
6. **Alkyl Hydroxylamines**—formed by mild reduction of primary nitroparaffins.
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8. **Beta-Dioximes**—condensing three molecules of an NP in presence of a weak base.
9. **Trialkyl Isoxazoles**—hydrolysis of Beta-Dioximes (see above).
10. **N-Alkyl Hydroxylamines**—mild reduction of primary NP's.
11. **Alkylidene Succinic Esters**—condensing NP's with alpha beta unsaturated acid esters.

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U.S.I. CHEMICAL NEWS

December ★ A Monthly Series for Chemists and Executives of the Solvents and Chemical Consuming Industries ★ 1950

New Chemical Assay for Panthenol, Pantothenates

Development of a rapid colorimetric method for the determination of panthenol and pantothenates has been announced. Since panthenol and pantothenates assume considerable importance as members of the vitamin B-complex family, the method should be of great interest to manufacturers of vitamin preparations.

The colorimetric procedure is based on formation of pantoyl lactone by hydrolytic cleavage in acid medium. The lactone reacts with hydroxylamine in the presence of alkali. The hydroxamic acid thus formed yields a purple color upon acidification in the presence of ferric chloride. This color is utilized for photometric measurements.

With the new assay, results can be obtained in shorter time than required by present microbiological procedure, it is claimed, with good agreement between both. The method reportedly can be applied for the assay of panthenol and d-calcium pantothenate in pure form as well as in tablets and ampuls. An adaptation of the method is said to deal with the determination of panthenol in multivitamin preparations. Through the use of an ion exchange resin column for the absorption and elimination of interfering ionic substances, the method is rendered specific for panthenol.

Booklet on Fundamentals Of Fire Extinguishment

A new 4-page booklet on fire has been released by a fire extinguisher manufacturer. It contains illustrated discussions of what fire is, classes of fires, and proper methods of extinguishment. Originally introduced as an aid in training company salesmen, it has been widely requested and used by fire departments, industrial fire brigades, insurance companies, and other fire protection groups. Copies are available from the company.

Patent Paper Parachute

A new, improved paper parachute is claimed to have many uses and to stand up under storage conditions. According to a recent patent, paper for the parachute is treated with 1 to 4½ parts of glycerine in 100 parts of commercial alcohol. When the paper has been thoroughly saturated, excess solution is removed and the alcohol is evaporated from the paper. Paper treated this way reportedly may be folded and tightly packed for storage without damage to it or cracking at the folds.

Dry Lubrication Processes

Processes said to impregnate surfaces of metals, plastics, rubber and ceramics with graphite so as to produce a dry lubricating film that reduces friction and wear are now being offered by an eastern firm. They are reportedly available on a job work basis, or if volume warrants, on a licensing arrangement.

Southern Agricultural Leaders See Practical Demonstration of New Control for Corn Insects

Guests Find 800 Bushels of Corn Still Insect Free After Treatment with Pyrenone Grain Protectant in June, 1949

THOMASVILLE, GA.—Pyrenone Grain Protectant, a new control for the insects which eat up half of the corn crop and thereby cheat the South out of a profitable livestock market, was recently demonstrated at the Greenwood Farms plantation to federal and state farm specialists and agricultural leaders from ten southern states. Dr. Walter E. Dove, director of entomological research for U. S. Industrial Chemicals, Inc., of Baltimore, and former chief of the Division of Insects Affecting Men and Animals, United States Department of Agriculture, said that the dream of the South in developing a livestock industry can never be realized as long as nothing is done to curb the insect menace.

150 agricultural leaders from Federal Government and 10 Southern states watching demonstration of application of Pyrenone Grain Protectant to corn.

"Insects, principally the rice weevil, eat almost as much corn and other grains as do animals in the South," Dr. Dove declared. "In too many instances, cattle have to be sold or otherwise disposed of in the spring because corn that was stored comparatively free of insect infestation in the fall is completely destroyed."

Dr. Dove spoke at a demonstration of the application of Pyrenone Grain Protectant on three types of corn storage, shelled, husked and unhusked. The Pyrenone Grain Protectant, which tests have shown to be free of toxicological hazards to humans and warm-blooded animals, is mixed directly with the corn to prevent insect infestation. Guests at the demonstration also inspected 800 bushels of corn which is still insect free after treatment with Pyrenone Grain Protectant in June, 1949.

Can Save Millions

Dr. Dove told his audience of 150 persons that the new insecticide can save the South untold millions of dollars. Its use, he said, is not limited only to corn, but can be effectively applied to rice, barley and other grains. A companion product, Pyrenone Wheat Protectant, was introduced this year for treatment of stored wheat. In both products the insecticidal ingredients are the same—a com-

MORE

New Data on Concentration vs. Germicidal Efficiency of Ethyl Alcohol

From the wide range of concentrations in which ethyl alcohol destroys the moist vegetative forms of bacteria, it appears that too much emphasis has been placed on the importance of diluting 95 per cent alcohol to a lower concentration. The statement that 95 per cent alcohol is practically worthless as a germicide needs to be qualified, according to a recent report in a scientific journal. It is not true when referring to the moist vegetative forms of bacteria.

Escherichia coli, *Salmonella typhosa*, and *Serratia marcescens* were killed, it is claimed, in 10 seconds or less by concentrations of ethyl alcohol of 100 to 40 per cent by volume. *Pseudomonas aeruginosa* was reportedly killed in 10 seconds or less by concentrations of 100 to 30 per cent by volume. Fifty to 90 seconds were said to be required to kill *Micrococcus pyogenes*, variety aureus, and *Streptococcus pyogenes*, respectively, by absolute ethyl alcohol. The organisms were killed in 10 seconds or less by concentrations of 95 to 60 per cent. Forty-eight hours were reported required to kill a 24-hour-old broth culture of *Bacillus anthracis* by concentrations of alcohol of 100 to 95 per cent.

Compounds in 50 per cent alcoholic solutions, which are recommended for disinfectants, probably owe their germicidal action in large part to the alcoholic solvent.

Mosquitoes Tagged with Radioactive Phosphorus

In an experiment in a western state, a million mosquito larvae have been treated with radioactive phosphorus. Within 24 hours, a larva absorbs enough P^{32} from a solution to make it detectable through its entire adult life. Later the mosquitoes are gathered and identified to determine two important facts: how long a mosquito lives and how far it flies. The work is expected to be the pilot study of future investigations of dangerous insects.

ADVERTISEMENT—*This entire page is a paid advertisement* *Printed in U. S. A.*

December ★ **U.S.I. CHEMICAL NEWS** ★ 1950

CONTINUED

New Control for Insects

bination of piperonyl butoxide and pyrethrins — and only the diluents, or carriers, differ. For Pyrenone Grain Protectant, fibrous talc is used as a carrier, and for the Wheat Protectant, finely-ground wheat is the diluent. The Pyrenone insecticides, he said, have been available commercially for several years, but their use in Grain and Wheat Protectants was investigated thoroughly for three years before they were produced for consumer use.

"The field tests with the Protectant have always shown a worthwhile degree of control

Some of party inspecting corn before and after treatment with Pyrenone Grain Protectant.

of the common grain insects, the degree of control depending upon the coverage obtained," Dr. Dove stated. Treatment of unshucked corn, which is always more or less field infested, can only give partial protection by preventing the spread of infestation to sound ears. Farmers say this is well worth while and they are not looking for miracles. On shucked corn, the degree of protection is much higher as the insecticide comes in direct contact with insects as soon as they emerge. The difference in the protection obtained certainly makes it worthwhile to shuck the corn before it is treated.

Dr. Dove said that a conservative estimate of protection on stored shelled corn was 10 months, and added that the treatment of stored shelled corn was definitely superior to that of the other two methods of storage now in common use.

Applying Pyrenone Grain Protectant by the layering method to snapped corn during the demonstration.

Develops New Vaccine Effective Against Mumps

Production of a preventive vaccine against mumps, one of the most common diseases of both childhood and adulthood, was announced recently. The vaccine, which may give immunity lasting for one year following the administration of two injections, is recommended for routine inoculation of children housed together in large groups, such as summer camps and orphanages, according to the announcement.

The scientist who developed the vaccine stated that the virus used in its manufacture is cultured in chick embryos. After a suitable incubation period, the fluid from a sac called the allantois is removed from the egg and centrifuged to obtain the virus sediment. This sediment is put into solution, inactivated with formaldehyde, and standardized with respect to its immunizing capacity. Before the vaccine was released, the announcement stated, more than 1600 individuals received vaccine, the greater part of this number with the cooperation of a state board of health.

TECHNICAL DEVELOPMENTS

An emulsion-type synthetic resin wood glue, designed for high shear strength coupled with a minimum of cold flow, has been introduced. It can be prepared in any desired viscosity to suit needs of the fabricator. **(No. 629)**

A new clear, quick-drying, plastic synthetic finish for hardware made of brass, iron, copper, gold, cadmium, chromium, and nickel has been announced. It can be treated to give steel or aluminum a gold or brass appearance. **(No. 630)**

A chlorinated rubber-base enamel for application by spray or brush on tank exteriors, structural steel, and concrete subjected to severe chemicals, is said to stand up to chemical fumes, calcium chloride deposits, and other chemicals. **(No. 631)**

Denser, stronger, more uniform concrete blocks and bricks are said to result from addition to the mix of small amounts of a surface active agent. It permits use of less water, providing "dry" concrete of greater strength. At the same time, plasticity needed for molding blocks and bricks is improved. **(No. 632)**

A new portable electroplating set operating on 110 volts AC can be used in electroplating gold, silver, copper, nickel, brass, cadmium, and tin, it is reported. **(No. 633)**

A new water repellent said to make all types of fabric impervious to moisture will be introduced soon in "bomb"-type dispensers. **(No. 634)**

A new refillable ion exchange unit designed for small-quantity users delivers, from an ordinary faucet, water equal in chemical quality to triple-distilled. **(No. 635)**

An abrasive metal said to be corrosion resistant and unbreakable has been developed. High tensile strength and yield points, ability to withstand impact without cracking or breaking, and antislip qualities are mentioned by the maker as advantages in ladder and stair treads, car steps, and running boards. **(No. 636)**

A portable vapor steam generator which supplies large quantities of high pressure steam for short or sustained periods has been announced. This machine reportedly develops 200 lb. working steam pressure in two minutes from cold water and makes over 3,500 lb. of steam an hour, at 75- to 300-lb. steam pressure. **(No. 637)**

A packaged electrolytic plant for converting salt into caustic soda and chlorine at the point of use has been developed. It consists of a mercury cell complete with denuder, a power rectifier, brine operation tanks (arranged vertically), brine recirculation equipment and caustic receiving tank. Space occupied is 3.5 by 25 feet. **(No. 638)**

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What's new

METHANOL AT ORANGE: Central figure in a tangled web.

METHANOL MUDDLE

Higher methanol demand and lower output have created a sellers' market. Formaldehyde, largely derived from it, is similarly affected.

DU PONT may well rue the day it decided to run a four-page advertisement in the *Saturday Evening Post* to extol the virtues of methanol anti-freeze as against ethylene glycol. Now the company wishes it had enough methanol to keep pace with increasing demands.

But the ad writers shouldn't take all the credit. Insufficient raw material supplies, a rising clamor for formaldehyde-based resins, and an apparent over-purchase of methanol anti-freeze for the current cold-weather season have all worked in concert to shove this commodity out of its extremely comfortable supply position and set it down in the hot seat—already occupied by most other chemicals—of increasingly uncomfortable scarcity.

Up and Then Down

After the war methanol production skyrocketed from 500 million pounds (1945) to an annual rate of 1,200 million pounds at the end of 1948.

Reasons for this quick growth are not far to seek. At war's end several firms purchased war-built ammonia plants, which are easily convertible to methanol. Not only do such units produce the synthesis gas (carbon monoxide and hydrogen) required for methanol, but the high-pressure know-how needed for ammonia synthesis is also necessary for methanol manufacture. Since methanol capacity was inadequate at that time, it was natural for these companies to move into methanol production to broaden the base of their revenue-producing activities.

This general situation accounted for the entry of two new producers: Spencer Chemical Co. (Pittsburg, Kan.) and Solvay Process Division (South Point, Ohio). Although producing on a relatively small scale at Peoria, Ill., Commercial Solvents Corp. falls into the same category. It started producing methanol at its war-built Sterlington, La., ammonia plant and has shut down the Peoria unit.

Du Pont, pioneer in interconversion of methanol and ammonia facilities, stopped making methanol at Belle, W. Va., but constructed a brand-new plant at Orange, Texas, where its production difficulties are currently centered.

Gas Hard to Get

Some time ago Du Pont was unable to get delivery, under its contracts, of the natural gas required by the Orange plant. Despite all-out efforts to minimize this difficulty by means of in-plant economies, it finally became necessary to trim methanol output to fit the shortened raw material supply.

About the same time the Korean situation intensified demand, leading to the present supply imbroglio. Consequently, Du Pont reopened the Belle plant last month, converting ammonia equipment to methanol, to help close the gap. In the meantime a new supplier, United Gas Corp., is intermittently delivering gas to Orange from Winnie, Texas, through Du Pont's pipeline.

No Real Shortage

The current shortage is no chimera, but—barring further difficulties like those that have plagued Du Pont and assuming a quick end to anti-freeze hoarding—those close to the picture are confident that current capacity, estimated at about a billion pounds a year, is sufficient. Supporting that view is the fact that producers have no immediate expansion plans.

At the moment, output of formaldehyde and phenol-formaldehyde resins is at an all-time high, and urea and melamine resins are being made at near-record rates. Any sizable increase in present requirements could easily prevent a straightening-out of the methanol market picture.

Also complicating the market is the ammonia situation. Du Pont says it will produce methanol at Belle only as long as the ammonia supply-demand balance permits; and the balance is now dangerously even. But new capacity will soon partly relieve the pressure of ammonia demand.

Dow Chemical Co. has just started up a 100 ton-a-day plant at Freeport, Texas, and Mississippi Chemical Co.'s 150 ton-a-day plant at Yazoo City, Miss., will operate shortly. There is also the possibility—tempered somewhat by the high cost of production—

that Morgantown Ordnance Works will resume production, either for the government or for private interests.

Thus the methanol picture is anything but a simple portrait. The central figure is inextricably enmeshed in a welter of confusing complexities in which the outlines of ammonia, formaldehyde, phenolic resins and urea-melamine can be discerned. No wonder then that methanol is in a muddle.

NO CASH NEEDED

V-loans make it easy for chemical manufacturers to fill defense orders.

NEED MONEY to fill your defense contract? If so, the Government will see that you get it. The fact that the funds you need exceed your normal line of credit won't be permitted to slow up the rearmament program.

The Defense Production Act gave the President power to set up a loan program with the sky as the limit. Since then Government agencies have worked feverishly on the machinery for passing out the cash. Some loans have already been made.

Familiar Look

The program is going to seem familiar: it resembles the one used in the last war. Then chemical, drug, rubber and explosive manufacturers had the use of almost $1 billion of government cash or facilities. They got close to $200 million through the Federal Reserve Board's V-loan program, another big chunk from the Reconstruction Finance Corp., and about $500 million via the Defense Plants Corporation, which built, equipped and leased factories to them.

Federal Reserve has already re-activated the V-loan program. Under it, each of the Fed's twelve District Banks is empowered to guarantee all or part of defense loans made by local lenders. The request for a guarantee must be approved by one of the armed services, the General Services Administration or the Departments of Commerce, Agriculture and the Interior.

The maximum rate of interest a contractor will have to pay is 5% and the local lender has to split the interest with the District Bank. If 70% or less of the principal is guaranteed, the Fed's guarantee fee is only one-tenth of the interest; if the local bank wants the Fed to cover more, the proportion he has to fork over rises—to half, when the guaranteed part of the loan exceeds 95%.

Generally, V-loans will go to sub-

Ewing Galloway

DEFENSE LOANS will satisfy need for working capital.

contractors who can't get advance payments from the armed services—though prime contractors will get them, too. V-loan money is expected to be used almost entirely for short-term working capital.

The only limit to the volume of loan guarantees the Fed will make is the amount the military is going to spend. In effect, a contract with the Government is a contractor's collateral. And as long as such collateral is available, the loans will be made. They don't take any cash to start with.

The contractor never gets directly involved in getting the V-loan. All he has to do is ask for credit at his regular bank. If the bank doesn't think his assets or his credit standing warrant a loan of that size, it files an application for a guarantee with the Federal Reserve District office. From there it's forwarded to Washington.

While waiting for an okay, the District Bank checks the borrower's credit. Meanwhile, in Washington, the Federal Reserve Board shoots the request over to a certifying officer at the Pentagon, often getting approval in a matter of hours. The District Bank is then notified by teletype, the local bank by phone, and the cash is made available on the spot.

RFC Last Resort

But what if the contractor has to buy equipment or needs a lot of working capital? In World War II, he would have been sent right to the RFC for a direct loan. This time, however, government agencies would rather see a contractor get one or more of the other kinds of aid provided for.

Why? Because the procurement agencies know that once a contractor has RFC money free and clear, they lose one control over his operations. They don't expect any shenanigans, but they would like to feel that they can put on pressure if needed.

Simplest way of all would be for the contractor to get advance payments from the procurement office he's dealing with. The money could be doled out in amounts scaled to the contractor's performance. Trouble is, this would help only a relatively few prime contractors.

Many Ways to Skin a Cat

For the sub-contractor, though, there is the government's power to purchase materials under whatever terms he deems necessary. So the General Services Administration could help out, say, a synthetic rubber maker by contracting to buy any part of his output for years to come, then advancing cash against delivery.

Or GSA could lease machinery to him—existing units owned by the government or new equipment bought direct from the manufacturers. Finally, a certificate of necessity permitting accelerated amortization of any new facilities might be the answer.

The kind of help a contractor gets will depend on how much he wants, the purpose, and the amount of cash available for advance payments or for purchases of output and equipment. Only when such funds are fully committed will the contractor be sent to RFC with the certificate that will get him some of the $2 billion Congress has authorized.

TRIPOLY TRIPLES

Built-detergent boom carries sodium tripolyphosphate to peak production.

WHENEVER you're called from your easy chair and evening paper to lend a hand with the dishes, chances are you'll be in intimate contact with one of the more spectacular chemical phenomena of the past decade: built synthetic detergents, of which Tide, Surf and Fab are well-known examples. Chances are, too, that the detergent builder in the dishpan will be sodium tripolyphosphate, growth of which since it was introduced in 1942 has paralleled the beanstalk-fast burgeoning of synthetic detergents themselves.

Phosphates are Old

There's nothing new about using phosphates in cleaning materials. Tri-

sodium phosphate, grand-daddy of them all, is contemporary with the horseless carriage. Ten years ago TSP production was over 100,000 tons. It fell thereafter, rose to a lower peak after the war, and has since declined to about 60,000 tons.

The first complex phosphate, tetrasodium pyrophosphate (TSPP) leapt into prominence in 1937, when Proctor & Gamble started incorporating it in Oxydol. Used particularly in built soaps and also in built synthetics, its output has risen to about 80,000 tons a year. (Ten years ago it was less than 50,000 tons.)

Pacing the field, however, is sodium tripolyphosphate (STPP), output of which has tripled in as many years to an estimated 1950 production of 200,000 tons. It is thus the leader among the complex phosphates, which also include the fast-growing sodium tetraphosphate and sodium hexametaphosphate.

Complexity Pays Off

The complex phosphates, which might be looked upon as dehydrated condensation products of monosodium and disodium acid phosphates, have outstripped the simpler TSP because they do everything TSP does and throw in a few bonuses to boot.

For one thing, TSP precipitates calcium and magnesium. It thus softens the water and saves soap, to be sure, but precipitation of insoluble salts is nevertheless a drawback. For another thing, it is strongly alkaline (pH of a 1% solution is 11.7) and thus harsh on the hands.

TSPP is less alkaline (pH at 1%, 10.2), does a better job of dispersing soil and soap scum, and sequesters calcium and magnesium instead of precipitating them; i. e., it holds them in a soluble complex in which form they don't react with soap. TSPP also disperses soap scum left in clothes by previous launderings.

STPP and other more complex phosphates have still an additional advantage: synergistic action. Other builders merely add their detergent effect to that of the soap or synthetic detergent; STPP formulations have a detergency that is higher than the sum of its parts.

Automatic Washers Help

The housewife of yore cleaned out her washing machine occasionally to remove the deposited soap scum and occluded dirt. Now that she has an automatic machine she can't get into, she has to use a built detergent to keep scum from forming.

That's one reason builder makers—Westvaco, Victor, Monsanto, Blockson, Virginia-Carolina, General Chemical, etc.—are looking forward to further expansion of output. Another reason is their knowledge that production this year would have been even higher had it not been for the soda ash strike. And, looking into the future, they're doing research on broad applications for builders outside of building *per se*. So far detergents have gobbled up their entire output; now they're putting a little aside for application research against the possibility of another revolution in a revolution-riddled industry.

LATEST NOR LEAST

Spectacular leap in acrylonitrile output is signaled by Monsanto Chemical Co.'s entry into field.

LATEST to join up but soon to be leading the parade of acrylonitrile producers is Monsanto Chemical Co., whose unit is now being built at Texas City, Texas.

Various news fragments indicate that capacity of the unit will be larger than the total of all now operating or under construction: First, the announced capital requirement of $30 million indicates, according to a common economic maxim in the chemical industry, an equivalent annual sales value of product—and that means at least 75 million pounds of acrylonitrile. Second, one of the first contracts to be let was for a 700 ton-a-day oxygen plant from Hydrocarbon Research, Inc. Size of this unit, for the process Monsanto reportedly will employ, is sufficient for a production capacity of 100 million pounds.

OSBORNE BEZANSON: No longer fantastic.

The Texas City product will be shipped to Alabama, where it will be used to make the polymer for Chemstrand Corp.'s new fiber. Chemstrand (owned half and half by Monsanto and American Viscose Corp.) is now building a multimillion-dollar plant on a 656-acre site on the Tennessee River at Decatur, Ala., for spinning the fiber. The relatively new company just got a new president: Osborne Bezanson, who was in on a lot of the process development work at Monsanto.

Four in One

The Texas City plant will actually be four plants in one, first of which is the tonnage oxygen plant already mentioned. Oxygen from this unit will be employed in the second plant to make acetylene from methane by a modified Sachse process, wherein part of the methane is burned to provide enough heat to "crack" a portion of the remainder to acetylene.

The third unit will make hydrogen cyanide by the reaction of natural gas and ammonia. This is the same general process that Rohm & Haas now uses at its Houston plant and which Carbide and Carbon Chemicals Division will use at its acrylonitrile plant now under construction at Institute, W. Va.

(Carbide, incidentally, will make its product by dehydration of ethylene cyanohydrin, derived from ethylene oxide and hydrogen cyanide. This is the general method used by American Cyanamid Co., only current acrylonitrile producer, at its Warners, N. J., plant.)

The final product will be made in the fourth plant by addition of hydrogen cyanide to acetylene, probably by a low-temperature catalytic reaction.

Sachse Gets Nod

Monsanto looked at all known acrylonitrile processes before deciding on adding hydrogen cyanide to acetylene; and it also investigated a large number of acetylene processes before deciding on its own improved version of the Sachse process.

First trials with the process, conducted as early as 1942, were on LPG hydrocarbons (mainly propane and butanes). Acetylene yields were good, but Monsanto concluded that it would be too vulnerable from the cost standpoint since the price of LPG hydrocarbons was on a constant rise.

A decision was made, therefore, that acetylene had to be made from methane, the cheapest and most abundant hydrocarbon. Investigation first centered on electrical processes for con-

verting methane to acetylene; and particular attention was given to I. G. Farbenindustrie's arc-cracking process used at Huls, Germany. This method was thoroughly studied in this country by the I. G.-Standard Oil (N. J.) subsidiary, Jasco Co, at Baton Rouge, La.

But this process proved too costly upon intensive study, and the Sachse process—with methane, this time—was taken up again. After a great deal of research the original Sachse burner was modified to give a product gas containing as much as 9% acetylene. Separation of the acetylene can be readily accomplished either by Hypersorption or solvent extraction of the water-cooled product gas.

Better Than Triple

This plant, to supply Chemstrand, and Carbide's plant, to supply itself (Dynel) and Du Pont (Orlon), tag synthetic fibers as front runner among acrylonitrile uses.

Completion of Monsanto's plant will undoubtedly show up the prediction of tripled 1949 acrylonitrile capacity (*CI, March 1950, p. 345*) as too conservative. Then CI said: "A prediction made back in 1946 that the potential market was 250 million lbs. may still seem fantastic—but much less now than then." Now, nine months later, it doesn't seem even slightly fantastic.

NO FISH STORY

Synthetic vitamin A is rapidly replacing its natural counterpart in most products.

FEBRUARY 6, 1950, was a bad day for the fisherman and their finny meal tickets. On this date Hoffman-La Roche, Inc., reported that tons of synthetic Vitamin A were pouring out of their new Nutley, N. J., plant devoted exclusively to production of this essential nutrient. In a little less than three years a laboratory synthesis had metamorphosed into a practical industrial process yielding commercial quantities of synthetic Vitamin A for the first time in history.

In contrast to the old fish-oil concentrate, the man-made vitamin has none of the pungent odor and disagreeable gastric after-effects. Anyone who has ever taken a healthy dose of cod-liver oil will readily agree that this is a step forward for civilization. Aside from its appeal to the senses, the product features many other advantages heretofore unknown to wholesale consumers. Starting with citral, a ten-carbon aldehyde obtained from lemon grass, as the principle raw material, it is entirely an offspring of carefully controlled synthetic technique and not subject to large fluctuations in potency and quality as was its odoriferous ocean-derived ancestor.

Dependable Supply

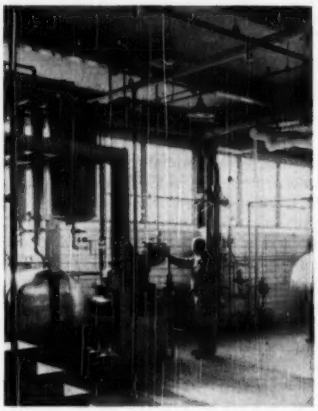
Another great advanatge to pharmaceutical manufacturers and other commercial users of the vitamin is the constant availability of the synthetic material. In the past, consumers were dependent upon remote sources of supply, and seasonal fluctuations in market price. To offset the dangers inherent in such a situation, they were forced to spend large sums of money to insure delivery, maintain substantial spoilable inventories, and gamble on product failures due to raw material variations. Today, the mass-produced vitamin can be bought as needed with the assurance of receiving uniform potency and quality in each batch.

Cost-wise the synthetic vitamin is more than a match for its fishy relative. Originally priced at 30 cents per million units, the cost soon fell to 24 cents and finally to 18 as it is sold today in standard million-unit-per-gram concentration. The natural fish oil concentrate on the other hand, also goes for 18 cents per million units, but the maximum available concentration is only 700,000 units per gram. The bulk difference when applied to storage and shipping expense tells the story.

Although the fish liver import people have already felt the squeeze, synthetic vitamin manufacturers are not yet completely in the driver's seat. There still exists a sizable market for low-potency natural oils in animal feeds and food additives where the encroachment of artificial nutritive agents is expressly prohibited by an anachronistic federal law. Eventually the synthetic product is expected to annex the animal trade, as its use will permit formulation of more stable feeds. A campaign now under way to have federal standards amended to include synthetic vitamin A compounds (as optional ingredients) has already resulted in an F. D. A. opinion which permits inclusion of the vitamin in food products without an accompanying statement of source.

Identical with the Natural

One of the stumbling blocks the synthetic producers have encountered in the promotion of their product is the unfortunate association of the word synthetic with the idea of a substitute or something not quite as good as



TONS OF VITAMIN A: Livers are passe.

mother nature's handiwork. That this conception is completely erroneous will never deter a small fringe of the public from demanding natural products in preference to the "ersatz." The synthetic vitamin has been demonstrated to be identical with the natural in its biological, physiological, chemical, and physical properties, though lacking its pungent odor. It is an unsaturated cyclic alcohol with the empirical formula $C_{19}H_{27}CH_2OH$ and like the highly purified natural forms, can be provided as the alcohol, acetate or ester (usually palmitate).

The availability of dependably pure synthetic products will open new avenues of research to the nutritional and clinical worker. The use of a material free of irrevelant compounds associated with natural products will permit investigators to obtain and evaluate effects more clearly. In the past it has not been uncommon to attribute various results to associated materials rather than to the vitamin itself.

Unlimited Supply

Probably the largest, Hoffman-La Roche is not the only frog in the synthetic pond. Merck and Co. and Chas. Pfizer and Co. are both in large-scale production, using a process based on the La Roche method. In addition, Distillation Products Industries of Eastman Kodak is making the synthetic vitamin by another process. An idea of potential output of synthetic vitamin facilities may be gained from the fact that La Roche's Nutley plant could supply the vitamin A requirements for the entire nation.

Cries of distress from our rapidly diminishing cod and shark fishing fleets are a certain sign that soon the fish and his liver will not be parted.

DAMP STRIKE

Recently developed book matches feature water-resistant striking strip.

NOT QUITE up to ball point pens, Universal Match Corp.'s new book matches will not light under water. But, there is very little else water can do to them to prevent their flaming mission. Probably the greatest boon to smokers since discovery of the T-zone, the new development is the result of more than 15 years' research and 20 months' testing of a new process perfected by chemists at Universal's St. Louis plant.

Not Water-Proof

While the company is the first to admit that their product is not water-proof, they modestly claim that they have succeeded to the extent of at least 90% toward accomplishing this goal by making a water-resistant friction strip. It seems that moisture's evil effects harm the striking surface of the match book far more than the match itself. The new friction strip will permit striking of the match even after complete saturation. All you have to do is wipe off the excess water and it is reportedly as good as new.

Another practical improvement on the conventional match book is the resistance of the abrasive coating to bleeding when wet with water, thereby preventing costly clothing stains. Tests on the new product showed that even when subjected to 100% humidity for periods of six months, the strip did not deteriorate, soften or show evidence of mold. This will permit long-time storage of the matches in hot, humid atmospheres without damage.

The secret of the new hydrophobic property is a carefully controlled chrome-tanning process on the glue used as an adhesive in the friction striking surface. The process is now under scrutiny by the Patent Office but as yet no patents have been issued. Striking strips of the new match books will be colored gray to set them apart from their less durable fellows.

WATER-RESISTANT MATCHBOOK: It's in the strip.

An important reason for the introduction of the new product is no doubt the apathy to book matches displayed by inhabitants of large sections of the country where high humidity is the norm. Acting on this premise, Universal will convert its entire annual production of an estimated three billion book matches to the water-resistant type in an effort to make inroads into the undeveloped market. There will be no hike in price for the improvement.

It might be stated that chemical treatment of matches to render them impervious to the detrimental effects of water is not a new or revolutionary development. During the past war, several companies were manufacturing stick matches for the armed forces that were waterproof in the true sense of the expression. It is common knowledge, however, that with the exception of pipe smokers, users of the old stick match are a vanishing species, and the play has shifted almost entirely to the paper variety. All we need now is a water-resistant cigarette.

DESIGNER'S DELIGHT

Chromic acid is a 20 million pound-a-year business. Chief market: chrome plating.

A MODERN automobile without chromium would be like a drug-store sundae without whipped cream, for dazzling chrome trim has become a symbol of the motor car. It makes life easy for the designer, too, since all he has to do is to change the position of a few shiny chrome gadgets and he has a new model.

Behind this glittering facade is a little-known 20 million pound-a-year chemical: chromic acid. Attention was drawn this month to the chemical behind chrome by Du Pont's sale of its chromic acid business to Diamond Alkali Co. Du Pont will continue to make the acid at its Philadelphia plant, but sales will be handled by Diamond. Reason for the sale wasn't disclosed, but it may well be that Du Pont's tie-up with the automotive industry through its large holdings in General Motors made such a move politically prudent. Diamond, already in the dichromate business, was an obviously suitable purchaser.

Four Competitors

With the acquisition of this product, Diamond now shares with Mutual Chemical Co., Jersey City, N. J., the largest portion of the chromic acid business. Two smaller acid producers are Fiber Chemical Corp., Cliffwood, N. J., and Better Finishes & Coatings, Inc., Newark, N. J.

Raw material for the acid is chromite ore (oxide of iron and chromium). Fusion of the ore with soda ash and limestone gives sodium chromate, which is converted to chromic acid upon treatment with sulfuric acid. The acid can also be made from sodium dichromate, which is obtained from sodium chromate by treatment with sulfuric acid or carbon dioxide.

Six plants produce dichromate: Diamond has two (Jersey City, N. J., and Painesville, Ohio) as does Mutual (Jersey City and Baltimore); Imperial Color and Chemical Co. has one (Glen Falls, N. Y.) as does Natural Products Refining Co. (Jersey City).

More Than Grilles

A quick look in any appliance store window shows that, while automobile bumpers and grilles may be the largest market, they are by no means the only one. Toasters, coffee pots, cigarette lighters, irons, and many other gadgets are finished with the familiar bluish metallic sheen.

But plating only takes about 70% of total chromic acid production. Various miscellaneous uses account for another 10%, and a healthy 20%—about 4 million pounds a year—goes into pigments. Zinc chromate is probably the most important—at least with military procurement on the rise. One of the best rustproofing pigments known, it is specified by the Army and Navy instead of the more common and less costly red lead. This sector of the market is the most likely to expand over the next few years.

Chrome plating, on the other hand, has likely reached a top level. Auto output is expected to decline from its present all-time record rate, and these gleaming vehicles certainly account for the largest acreage of plating.

More significantly, chrome plating for civilian goods may soon, as during World War II, be cut by fiat. Most of the chrome ore is imported, and is thus susceptible to curtailment when shipping is endangered, and military needs for chromium alloy steels are enormous. Those facts could easily add up to chromeless cars on America's highways.

CROWDING FIELD

Jefferson's new ethanolamine plant will provide three-way competition.

FIRST of the year will see the start of construction of Jefferson Chemical Co.'s new plant at Port Neches, Texas, for the production of mono-, di- and triethanolamine; and by fall Jefferson will join Carbide and Carbon Chemicals Division (which makes them at S. Charleston, W. Va.) and Dow Chemical Co. (whose unit is at Midland, Mich.) in producing these increasingly important compounds.

Raw materials for the sizable new unit, to be built by C. F. Braun & Co., are ethylene oxide, which Jefferson already makes, and ammonia, which will presumably be purchased from any of several near-by producers. Proportion of each of the three products has not been mentioned by Jefferson, but the reaction normally gives about 35% mono, 15% di, and 50% tri (*CI, July 1950, p. 24*).

Second Addition

The ethanolamines are the second addition—the first was a nine-carbon-alkyl phenol—to Jefferson's initial (1948) roster of products: ethylene oxide, ethylene glycol, diethylene glycol, ethylene dichloride, and dichlorodiethyl ether. Jefferson chlorhydrinates ethylene to make oxide and glycol, obtaining chlorine from Southern Alkali Co.'s Lake Charles, La., plant and hydrocarbons for ethylene from the Texas Co.'s Port Arthur, Texas, refinery. (Jefferson is jointly owned, of course, by the Texas Co. and American Cyanamid Co., and the latter owns 49% of Southern Alkali Co.)

Many Markets

No single use accounts for expanded production of the ethanolamines. Rather, growing demand stems from a multiplicity of uses, most of which exploit the mildly alkaline property of the materials. Among their uses: scrubbing acid gases (hydrogen sulfide, carbon dioxide, etc.) from gas streams; preparation of fatty acid ethanolamides for shampoo detergents; and as a liquefying agent in making 2,4-D salts. About the only other major use is the synthesis of morpholine, presumably from diethanolamine, by Carbide and Carbon. Morpholine is widely used as an emulsifier, particularly in self-polishing floor waxes.

All these markets, together with many smaller ones, should provide plenty of elbow room—even after Jefferson crowds into the field.

AGED IN WOOD

Wood pulp by-product yields interesting new organic intermediate.

ACETOVANILLONE, latest addition to a growing breed of lignin derivatives sired by the Chemical Division of the Marathon Corp., Rothschild, Wis., is old hat to the organic chemist. Despite its appearance in the literature as far back as 1876, there never was enough of the material to warrant full investigation of its potentialities. Now, though comparatively old in academic circles, acetovanillone is anticipating its first fling in industrial high society. Reason for this twilight vigor is the development of a process for the extraction of the product from lignin, a component of spent cooking liquors from the sulfite pulping process used in paper manufacture.

First Class Headache

The spent cooking liquor from pulping was a first class headache to the paper makers for more years than they would like to admit. Even today, the dumping of these acid wastes has contributed in no small way to the pollution of streams in the vicinity of paper mills. The fault however, was not entirely with the paper manufacturers. Due to its extreme corrosiveness and scaling ability, no suitable method of utilization or disposal had been developed until 1927 when the Marathon Corp. achieved the economical recovery of lignin from the acid liquors by fractional precipitation. The company's chemical division, a direct outgrowth of this development, makes good use of part of the lignin resulting from this country's annual production of 2½ million tons of sulfite pulp.

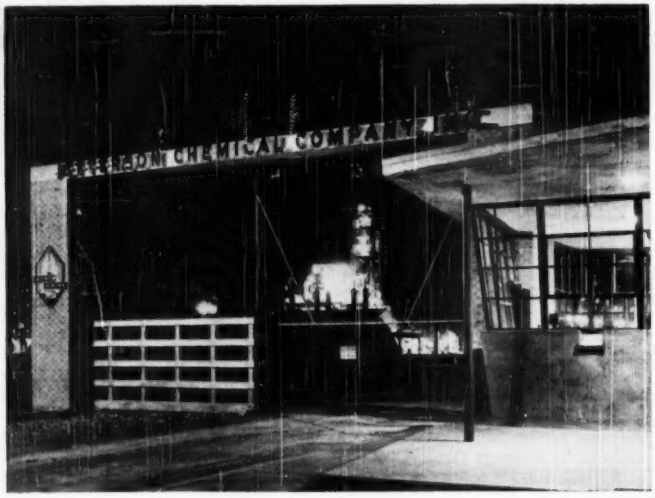
Lignin derivatives find use in such varied industrial applications as oil well drilling, cleaning compounds, ceramics, dyes, pigments, foundry sands, rubber and leather products. Perhaps the best known lignin-based chemical is vanillin, a flavoring agent used in foods.

Acetovanillone, available in pilot plant quantities at about 99% purity, is obtained from the alkaline degradation of the complex lignin molecule. The compound's high ultra-violet absorption in organic solvents would indicate its use as a sun-screening agent.

Looks Promising

Aside from vanillin, it is the only lignin-derived fine chemical now available. As such it has real possibility in organic synthesis. A white crystalline aromatic ketone, the material possesses an interesting structure describable as 3-methoxy-4-hydroxy acetophenone. Chemical configuration and reactivity suggest its utilization as an intermediate in the synthesis of photographic chemicals, food preservatives, pharmaceuticals, fungicides, antioxidants, plant hormones and dyes.

A new synthesis for papaverine (an antispasmodic), appreciably shorter than the old Pictet-Gams method,* has already been developed with acetovanillone as one of the starting mate-



JEFFERSON CHEMICAL: A second newcomer joins its roster.

* Starting with catechol and vanillin.

rials. Judging from its structure, it seems plausible that phenyl-ethanol-amine type drugs such as adrenalin could be synthesized from acetovanillone. Another deduction is phenolic photographic reducers, but pencil and paper chemistry is at best nothing more than speculation. The ultimate proof is in the pudding of experimental evidence.

GUM TURP SLIPS

Turpentine farmers' troubles focus attention on declining industry, points up need for improved technology.

A SUIT just filed by the U.S. Department of Justice in Federal Court at Savannah, Ga., against the Savannah Cotton and Naval Stores Exchange, Inc., highlights a controversy that has long been going on in the turpentine trade between the growers and the exchange. The American Turpentine Farmers Association Cooperative, with headquarters at Valdosta, Ga., has repeatedly charged that transactions in turpentine and rosin on the Savannah exchange have been "rigged" through fictitious sales.

Sales of turpentine and rosin on the Savannah exchange are handled on a sealed-bid basis in contrast to the oral bidding employed at many commodity exchanges. Prospective bidders are informed during the morning of offerings and the sealed bids are opened at noon. In case of a tie, new bids are immediately taken.

Crude gum producers claim that the sale of minuscule quantities by this method unfairly affects the entire production of 8,000 farmers in the turpentine belt which extends across the coastal plain from the Savannah River to the Mississippi.

Enfeebled with Age

This suit also focuses attention on an industry that is probably more trouble-ridden than any in the country. Although dating back to colonial days and therefore one of the oldest in the United States, it has come perilously close to virtual extinction on several occasions. The most crucial period of its existence was about 15 years ago when the American Turpentine Farmers Association Cooperative was organized. At that time gum turpentine was going begging at 17½¢ a gallon (against a recent price of 70½¢) and prices had been going down for years. Substitutes like mineral spirits, and the products of the steam distillation plants which use pine stumps as their raw material, had taken away some of the gum turpentine business.

TURPENTINE FARMER: A genius is needed.

CCC to the Rescue

The Commodity Credit Corporation was the pulmotor which then saved the industry from an imminent demise. It was only after a long battle in Washington that the turpentine growers were able to persuade the Government that they were farmers and not producers and thus obtained the loans which carried them through.

During that critical period turpentine was sold to the trade in 50-gal. barrels. Those who wanted to buy gum turpentine from a paint or hardware store had to take their own cans with them. Turpentine had lost out as an ingredient of paint and was losing its position as a paint thinner. Demand had been decreasing year by year.

In 1938, seeing that the worst was over but that only heroic methods could save the industry's dwindling markets, the growers' association, with the cooperation of the refiners, inaugurated a national advertising campaign which has since been carried on with astonishing results in promoting a product over retail counters that was formerly sold largely to industrial users. In 1938 most of the gum turpentine was being shipped in tank cars, but the U.S. Department of Agriculture says that 96 per cent is now being sold at retail in bottles.

But despite the recovery of part of its markets, gum turpentine on a peacetime footing was still losing ground to competitive products. In the first quarter of the current naval stores season (April 1 to June 30) production was 98,580 barrels—5 per cent less than was produced in the same period last year. During the second quarter of this year wood turpentine output totaled 102,090 barrels, an increase of 29 per cent over the corresponding 1949 period. Of that total, 56,110 barrels—10,000 barrels more than in the 1949 second quarter—were accounted for by the steam distillation process.

New Technology Needed

Even with the help of its advertising program and the assistance of scores of USDA and state experiment station experts, the gum turpentine industry still needs a drastic change in methods to preserve its future. A cooperative marketing plan has recently been advocated by the American Turpentine Farmers Association Cooperative, the object of which would be to pool supplies and control prices. But more than this is needed improvements in techniques for gathering the crude gum, which have changed little since early days. A genius is needed who could devise a machine to do the chipping, hang the cups, apply acid to the streaks to stimulate the flow of gum, and then collect the gum. Only this would eliminate the costly hand labor which makes it necessary for a single worker to walk thousands of miles a year.

Said Albert G. Snow, Jr., a silviculturist at the Lake City, Fla., branch of the Southeastern Forest Experiment Station: "Turpentining can continue to pay dividends only if the results of modern research are put into practice."

MINDLER, GILWOOD AND PAULSON: The defect was remediable.

FIXED-UP PHOSPHORIC

Ion exchange lowers cost of phosphoric acid pickling.

PHOSPHORIC acid, used for coating steel, has a lot of advantages over sulfuric pickling followed by phosphate coating; but it has one serious—and until now, irremediable—defect: It was too expensive until the Permutit Co.'s commercial unit for Caterpillar Tractor Co. at Peoria, Ill., remedied the irremediable with a new process.

The story of how the obstacle was overcome starts several years ago, when the Permutit Co.'s researchers tried unsuccessfully to upgrade crude phosphoric acid to food grade by the use of cation-exchange resins. It turned out that the resins available at the time—sulfonated phenolics or coals—were too unstable and had too little capacity in strong acid solutions.

Possible with Polystyrene

Development of sulfonated cross-linked polystyrenes, of which Permutit Q is an example, made it possible to remove metal ions from strong acid solutions, and Permutit's C. F. Paulson and A. B. Mindler, under the supervision of M. E. Gilwood, seized upon the idea of using this resin to cut the cost of phosphoric pickling. Permutit Q is stable at high temperatures, rugged, and has high capacity in acidic solutions.

Phosphoric pickling is preferred over sulfuric for several reasons:

- Sulfuric increases corrodibility of the steel, while phosphoric, after removing scale, rust, grease, etc., leaves a corrosion-resistant surface.
- Even under the best conditions, sulfuric eats up a lot of good metal, and the loss is very high if work is left in the bath too long. Phosphoric doesn't dissolve as much metal after scale is removed.
- Surface of the metal after phosphate pickling is ready for direct painting, enameling, or electroplating.
- Sulfuric pickling requires more rinsing and hence more tanks.
- There are no obnoxious or corrosive fumes with phosphoric.
- Since less metal is dissolved by phosphoric, waste disposal is simplified.

Operation of the process is simple. Phosphoric pickling baths are usually proprietary products consisting of 20%-40% acid and additives such as inhibitors and wetting agents. Among the trade names of such proprietary products are Prep-Pik-L, Parco Cleaner 210, Sol-Klean No. 1122, and Deoxidine.

In conventional use the pickling bath is discarded, in whole or in part, after it has picked up 3% iron. A small quantity of dissolved iron is necessary in the pickling-coating process, but if the content rises above 3% the operation becomes too slow.

In the Permutit process a portion of the bath is intermittently circulated through the ion exchanger to remove dissolved iron, whereafter it is recirculated to the bath. The over-all iron content is thus held at the optimum point. After exhaustion, the resin bed is backwashed and regenerated with sulfuric acid. Phosphoric acid losses are negligible.

Cost Data the Key

Practical criterion of the process is cost, and here Permutit engineers have used their pencils and slide rules on a commercial installation to prove their point. Taking as an example the pickling of 100 sq ft of finished 13-gage hot-rolled steel sheet, they compared cost of straight sulfuric pickling, phosphoric pickling without regeneration, sulfuric pickling followed by a phosphate coating, and phosphoric pickling with resin regeneration.

It is evident from these figures that phosphoric plus ion exchange is not only cheaper than sulfuric pickling followed by a phosphate coating process, but is even cheaper than straight sulfuric pickling.

	Sulfuric	*Phosphoric*	*Sulfuric plus Phosphate Coating*	*Permutit Process*
Iron loss (@ 5¢/lb)	18.75¢	1.50¢	18.75¢	1.50¢
Sulfuric acid	4.90	.....	4.90	7.30
Phosphoric acid	.....	43.10	1.10	2.27
Metals added to H_3PO_4	.....	.....	0.60	.....
Water	0.66	0.55	0.99	0.70
Lime	2.70	4.23	2.70	2.82
Labor and overhead	13.10	13.10	20.20	16.30
Equipment amortization	0.12	0.12	0.30	1.20
Total	40.23¢	62.60¢	49.54¢	32.09¢

VERSATILE VITAMIN

Recently developed uses for vitamin K-like substances prophesy their growing commercial significance.

DISCOVERED in 1929 and isolated from alfalfa ten years later, an oily substance labeled vitamin K spurred scientists on two continents to intensive probing of its nature and properties. Reason for the stimulus was the revelation by this K-factor of striking physiological potency. The substance showed a marked ability to decrease blood clotting time, and held forth to the medical profession a means of alleviating the plight of countless "bleeders."*

Postulated to be disubstituted naph-

* Persons with excessive blood clotting time, not necessarily congenital hemophiliacs.

thoquinones by Harvard's Louis F. Fieser in 1939, the structure of antihemorrhagic factor 2-methyl-3-phytyl-1,4-naphthoquinone was established shortly thereafter by synthesis (from 2-methyl-1,4-naphthohydroquinone) and called vitamin K_1. Subsequently several similar compounds were determined and tagged K_2, K_3, etc. All may be grouped under the generic title, vitamin K.

Occurring widely in green plants, sufficient amounts are obtained in the diet to meet normal body requirements. Alfalfa is so rich in this vitamin, that for some time before a satisfactory synthesis was devised, the plant served as its sole source.

Fights Tooth Decay

Primarily of therapeutic importance, the properties of these quinones have lent themselves to the development of products more commercial in nature. Chemically the simplest, vitamin K_3 (2-methyl-1,4-naphthoquinone), commonly known as menadione, is the chief case in point. Rather easily prepared by oxidation of β-methyl naphthalene, it exhibits a variety of interesting features.

An antimicrobial and possibly specific for the lactobacillus believed to be chief offender in tooth decay, menadione prevents the bacterial conversion of carbohydrates to acids. Good use of this property has been made by employing the water-soluble (sodium bisulfite) form of the substance in a tooth paste appearing under the name D-K, which sells more than a million tubes annually. Manufacturers of this dentifrice claim that its cavity-preventing prowess is due to vitamin K abetted by urea, source of the now-famous ammonium ion. Another indicated application is its use as a preservative to prevent spoilage of wines and beverages.

Not Cheap

Priced at about $60 a kilogram, highly pure 2-methyl-1,4-naphthoquinone is available from producers such as Abbott Laboratories, Parke Davis and Co., and Fine Organics, Inc., for pharmaceutical purposes. Now being made in pilot-plant quantities by Velsicol Corp., the compound after preliminary testing has been recommended by the manufacturer for use as a fungicide. Although complete informaiton on the fungicidal possibilities and potential market has not been evaluated, it is a good bet that there will be a new and more attractive price tag on the commercially available product in the near future.

NOT SO REFINED

Growing imports of refined natural waxes imperil domestic refiners, may shift wax stockpiles to countries of origin.

FOR YEARS South Americans have shipped crude natural wax to this country (among others) and it has been refined here into grades suitable for domestic consumption. Apparently the powers in the producing areas think that U. S. importers and refiners have had too much of a good thing, for they are doing more and more of their own refining until now they pose a distinct threat to this segment of the domestic chemical raw materials industry.

U. S. importers and refiners, for their part, think that this purified wax passing duty-free through ports of entry is too much of a not-too-good thing. It is no secret that they'd like to see a duty on refined waxes. And claims that the grades of so-called refined wax coming into this country don't compare with our domestic refineries' products are common enough to indicate their low opinion of foreign refining practices. Enough wax consumers, however, seem sufficiently satisfied to convince the South Americans that they are on the right track. It is fairly evident that domestic opposition can be effective only on the legislative front.

N.S.P.F.

Although this trend is embarrassing to wax importers and refiners, there is little immediate relief in sight. All the basic causes of their grief are American-made: our customs law, our lack of definitions for wax and our enterprising equipment salesmen.

According to U. S. Customs Tariff law, any animal, vegetable or mineral wax not specifically provided for (n.s.p.f.) is admitted duty free. Since bleached beeswax is the principal wax for which a specific duty is provided, all the others—carnauba, ouricuri, candelilla, Japan, montan, ozokerite, etc.—are "n.s.p.f." and consequently on the free list. A wax that has been subjected to processing such as blending or refining is still a wax and as such is admitted free under the law.

There are, however, import taxes on certain materials such as fatty acids that may be added to waxes, but only the fatty acid content, for example, of such a compounded wax is taxable.

Attempts to collect revenues on many blended and modified waxes, nevertheless, have been generally unsuccessful because it is a matter of court judgment whether the product is of chemical manufacture to be taxed under some category of customs regulations or a duty-free wax. Lack of precise definitions, many U. S. refiners and compounders feel, has permitted free importation of materials that compete with American products manufactured at costs reflecting our higher standard of living.

One step toward standard definitions and tests for waxes is research being sponsored by the American Wax Importers and Refiners Association, Inc. This relatively new group has already had an extensive study of carnauba wax characteristics made (*CI, February 1950, p. 216*) and the new technical committee on wax polishes and related materials of the American Society for Testing Materials may shed some light on the problem. Out of such work are expected to come acceptable definitions and tests that may remove

BRAZILIAN CARNAUBA: A changing picture.

some of the uncertainty in classifying waxes.

Peripatetic Salesmen

While improvement in test methods will help wax importers, advances on another technological front are likely to add to their worries. Much of the purified wax causing them concern—carnauba is an outstanding example—has been processed with centrifuges sold by U. S. companies to South American interests. Centrifuging replaces filtration with plate-and-frame presses and subsequent solvent extraction of the filter cake, the common method used in this country. Some domestic wax people hold that this removes only the coarse dirt from the crude wax, that the resultant product has to be refined for many uses, and that when it is, refining by filtration is more difficult and the losses greater.

Manufacturers of emulsion floor polishes—one of the chief outlets for carnauba—apparently are not bothered by this, for they make emulsions of such centrifuged wax, and then run the emulsions through another centrifuge to remove any suspended dirt. Sharples Corp., for example, sells its "no foam" type Supercentrifuge to wax specialty manufacturers for this purpose. These are totally enclosed, have a capacity as high as 400-500 gallons per hour, but can be run as low as the user desires.

Similar centrifuges, but not enclosed, refine such waxes as carnauba, ouricuri, candelilla and beeswax. South America has been the principal market, although a few have been sold in this country. Some equipment suppliers feel that such refining equipment would be in greater domestic use but for the traditional reluctance of wax processors to discuss their technical problems with anyone—including equipment engineers.

Shift in Stocks

If waxes refined by centrifuging and by other methods continue to find ready buyers in this country, the wax refiner will be faced with a continuously shrinking business potential. The importer's danger is not so apparent, but in the long run he may be cut out entirely by the establishment of foreign selling agencies—possibly governmental—which will sell directly to consumers. Stocks of both crude and refined waxes will be held in the countries in which they are produced, and price and supply may be more carefully regulated than they are now.

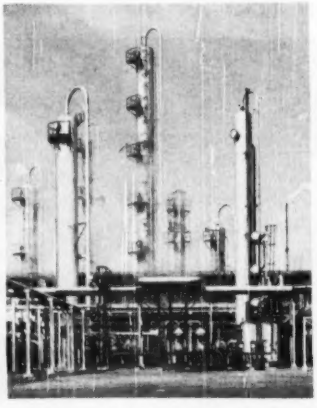
Many people in the wax business feel that the varied industrial applications of these natural materials make them strategic to the nation's defense, and that this lessening of control over its supply is dangerous. The price differential between imported purified wax and domestically refined may run 2-5¢ a pound, although if carnauba, for example, is tight, there may be no difference in price. In some quarters it is held that manufacturers taking advantage of this small saving may in the long run be doing themselves a disservice; for they are encouraging a trend that could eventually mean higher prices if supply of these main natural waxes is beyond domestic control.

OFF THE WAGON

Formaldehyde in alcohol offers shipping and storage savings to manufacturers of alkylated urea resins.

LIKE so many other contemporary figures of distinction, formaldehyde has switched. On the wagon since its inception as a self-respecting member of chemical society, formaldehyde is now swimming in alcohol and having a big time in the process. Reason for this drastic departure is the marketing of the Formcels, relatively water-free alcoholic formaldehyde solutions developed by the Celanese Corp. of America for producers of alkylated urea-formaldehyde resins.

Long familiar in its 37 per cent water solution (formalin) and in a variety of other guises, formaldehyde needs no introduction to the resin manufacturers. The new alcoholic form finds its work cut out for itself in the 40 million pounds of formaldehyde earmarked annually for butylated resins alone, representing about one-third of total urea-formaldehyde resin poundage. Although not as prominent as butylated products, methyl and propyl substituted resins also take a good share of the market.



CHEMCEL FORMALDEHYDE: Swimming in alcohol.

Cuts Shipping Cost

A result of research carried out at the Celanese Petroleum and Research Laboratory, Clarkwood, Tex., the Formcels are available in methyl, propyl, and butyl alcohols in 40 per cent concentration (55 per cent in methanol) to permit substitution of these alkyl groups as required. Greater concentrations are possible, but solutions turn cloudy when the above mentioned limits are exceeded. No special reaction techniques are needed and polymerizations are performed directly in the alcohol, thereby eliminating the procedure of adding outside alcohol to the reaction mixture.

Eliminating this production step makes the separate purchase of alcohol unnecessary and savings in shipping, storage, and handling become apparent. The stabilized ready-for-use Formcel may be handled at regular temperatures in standard liquid phase equipment, freeing storage tanks and units previously used for alcohol. Surprisingly, Formcel (an inflammable gas in an inflammable liquid) has a flash point about 50 degrees higher than formalin.

Cheaper Too

Cost-wise, the Formcels compare favorably with existing formaldehyde products. Formalin which sells at about 3¼¢ a pound figures out to 10¢ per pound of formaldehyde on a 100 per cent basis. Paraformaldehyde containing 91 per cent formaldehyde goes for 13½¢ per pound, equivalent to a formaldehyde price of 15¢ a pound. The Formcels are priced to yield formaldehyde at 13¢ a pound—slightly cheaper than the combined price of formalin and alcohol.

Only recently a glut on the market, formaldehyde is now firmly in the ranks of scarce items, due to a tremendous increase in demand coupled with the current shortage of methanol. Although it might seem strange at first glance to see a new formaldehyde make its appearance at this time, it must be remembered that Celanese makes its product from hydrocarbon gases (at its Chemcel plant, Bishop, Tex.) and is independent of methanol fluctuations.

The new product is not meant to compete with formalin for the entire resin market. Rather, it is

felt that the Formcels by virtue of their special application, can hold their own when things get back to "normal."

FORM FORUM

Industry advises government on the preparation of federal reporting forms.

GATHERING of statistics costs the country about 5 billion dollars a year, even with no war going on. Since the outbreak of fighting in Korea and the resultant necessity for increased government controls, this figure is continually being revised upward.

To date, four departments of the Government, Defense, Interior, Agriculture, and Commerce, have merely begun to scratch the surface of our economy with federal controls. Normal accounting procedures are bound to become more and more burdened with federal administrative and statistical record keeping and reports. However, if government officials learned their lessons, some of the ludicrous trial-and-error mistakes of World War II ought to be avoided; and so far, the lessons appear to have been well learned.

What made up the peacetime 5-billion-dollar statistics program—the industry without a smokestack? Such programs as the censuses of manufactures, distribution and population; the load of reports needed by the regulatory commissions; data collections by BLS, BAE, and BAI, just to begin a string of "call letter" federal agencies issuing quiz forms. All told, there are about 6,000 current federal report forms and questionnaires ranging in size from postcards to books.

But it takes a lot more information to mobilize militarily; and the list of mobilization, economic control, and stabilization reports is growing daily. Major programs for which reports and questionnaires have been issued or are in the planning stage looks like this:

Inventory control priority program
Plant operations reports
Wage-price control reports
Fuel and power control reports
Plant security controls and reports
Credit controls and reports
Materials controls
Manpower controls

Report Coordinator

As we again face a war-conditioned economy, the task of the Bureau of the Budget and its important assistant, the industry-sponsored Advisory Council on Federal Reports, takes on added importance in controlling the major paper work threat that confronts us.

Recognizing that the imposition of an undue burden on industry by requiring the filling-in of a multitude of uncoordinated report forms was more of a help to our enemies than ourselves, Congress passed the Federal Reports Act of 1942. The Act's stated intent was "to coordinate Federal reporting services, to eliminate duplication and reduce the cost of such services, and to minimize the burdens of

P. K. LAWRENCE: He prevents snowstorms.

furnishing information to federal agencies." The responsibility for this coordination was placed upon the Director of the Bureau of the Budget. (Legal federal reporting forms contain the following imprint on the upper right-hand corner of the face sheet:

"Form approved, Bureau of the Budget No. ....
Expiration date ....."

Forms lacking this imprint should be treated as suspect.)

Essential aid from industry was obtained with the establishment of the Advisory Council on Federal Reports at the request of the Budget Bureau's Director. The function of the Council is unique in that, while it is an industry-sponsored group, it can say "no" to Government agencies about to issue a nonessential or burdensome questionnaire and make that "no" stick. Then, too, the Council is a "friend at court" to industry, should there be a just complaint of "undue burden" against a report form.

Operating quietly, anonymously, without fanfare or credit claiming, the Advisory Council on Federal Reports is all too little known to industry in spite of the fact that a great deal of credit should go to the Council for the marked trend since 1942 toward sensible, compact and explicit Government report forms.

Chemical Committees

Currently there are 24 committees, many with subcommittees or panels. The number of committees or panels can be increased if needed. There are about 200 voluntary advisors now serving in the Council. The Committee on Chemicals Reports has operated continuously since 1942 and work is carried on largely through a group of 11 subcommittees dealing with the following fields:

Coal tar dye
Cyclic intermediates
Elastomers
Flavors and perfume materials
Medicinals and pharmaceuticals
Miscellaneous synthetic organic chemicals and plasticizers
Organic lakes and toners
Plastics materials
Rubber processing chemicals
Surface active agents
Definitions

Under the able leadership of its chairman, P. K. Lawrence of Du Pont, the Committee on Chemicals Reports advises the Bureau of the Budget on such important undertakings as the chemical reporting and statistical programs of the Census Bureau, particularly in the field of plastics, and on report forms used in the preparation of the Federal Tariff Commission's Annual Report on Synthetic Organic Chemicals, which is used as a catalog of these chemicals throughout the chemical industry.

As the National Production Authority and other agencies involved in mobilization controls prepare additional questionnaires, many important report forms related to the chemical industry will be channeled through the Committee on Chemicals Reports. Thus the Committee has an important function to perform for Government and the chemical industry alike, and its value to the defense effort can hardly be overrated.

Any company confronted with a reporting problem is welcome to take that problem to the offices of the Advisory Council at 1615 H Street, N.W., Washington, D. C. During World War II, after the Federal Reports Act was passed, an estimated 95 per cent of all possible questionnaires were eliminated by an all-out government-industry attack upon waste and duplication. The Council is ready to avoid any repetition of the early World War II snowstorm of questionnaires.

Patent Law Revision Under Way

by HARRY GOLDSMITH, Patent Attorney
Upper Montclair, N. J.

H. R. 9133 represents the first general revision and codification of the patent laws since 1870. That this is not just another patent bill is indicated by the co-operation given by 22 patent law groups and 7 industry organizations in its drafting.

AT PRESENT the patent laws consist of about sixty sections of the Revised Statutes, together with over sixty acts of Congress. In addition perhaps over 1000 patent bills have been introduced within the last 25 years, many of which proposed substantial amendments to the patent law.

After reviewing the entire situation, Sub-Committee No. 4 of the House Committee on the Judiciary prepared a preliminary draft, or so-called "Committee Print" of a proposed "omnibus" bill which was issued on January 10, 1950 ". . . for the purpose of inviting suggestions, comments and criticisms . . ." from interested parties.

Here was something to work on. Under the auspices of the National Council of Patent Law Associations, a "Coordinating Committee" was formed. Some 22 patent law associations and 7 industry associations are represented on this committee, which invited the views and recommendations of all interested parties, determined where there was substantial agreement, where there was substantial opposition, and where opinion was substantially divided. This information was communicated to the House Committee, chairmanned by Joseph B. Bryson. H.R. 9133, introduced on July 17, 1950, was the result.

Presentation of this bill provides an opportunity for a complete study of our patent laws and for clarification of the many problems that have arisen in their administration and judicial interpretation. The chemical industry should not miss this opportunity to make its views known.

WHAT DOES H.R. 9133 DO?

The existing acts relating to patents are arranged and consolidated into a single enactment. Various amendments are presented on which there is substantial agreement. Thus, it would provide for so-called "use patents" in a limited sense, write into statute law the doctrine of contributory infringement, set up an objective test or standard for determining invention, permit publication of pending applications, allow changes by inventors under certain conditions, provide for so-called patents of addition, protect intervening rights where patents are reissued, etc. Various amendments presented in the "Committee Print" which are of a controversial nature are not in H.R. 9133.

Let us examine some of the more important amendments proposed.

1. Would a new use for an old compound be patentable?

Under present law the discoverer of a new use for a known compound cannot obtain a patent on the new use of the compound per se. Yet some of the most important developments and applications of chemical research have resulted from the discovery of new uses for known compounds. Thus, Dr. Paul Muller, discoverer of the insecticidal properties of DDT, an old compound, did not get a patent claiming DDT per se as an insecticide. A new use of a known material may, of course, be patented as a method, but many believe such method patents are of little value in view of the virtual impossibility of enforcing them. For example, if the patent merely covers the method of spraying insects with a known compound A to kill them, the owner can not possibly sue the millions of individuals who might spray insects with compound A. On the other hand, many feel that if patents were granted in which the old compound could be claimed in terms of its new use, then the unlicensed manufacturer who puts up and sells compound A for that use could be held as an infringer.

The proposed bill contains a paragraph which, according to accompanying explanatory notes, assures that a new "art" which is but a new use of a known material is capable of being patented. But close reading shows that this paragraph merely emphasizes that a new use of a known compound may be patented as a method.

2. Can X sue Company Y for contributing to the infringement of his patent?*

Under a relatively recent decision of the Supreme Court, the doctrine of contributory infringement is believed by many to have been abolished. The doctrine which existed prior to this decision and was court-made law held that a third party whose activities did not come under the claims of the patent but who knowingly assisted one in the infringement of the patent could also be sued as a contributory infringer. Since that decision some courts have held that the mere attempt of the owner of the patent to sue the contributory infringer constitutes a misuse or illegal extension of the patent right. By a distinct amendment in the new bill the doctrine of contributory infringement would be restored in cases where the component constituted a material part of the invention and was especially made or especially adapted for use in an infringement of the patent, and not suitable for substantially noninfringing use. However, the mere sale of any staple article or commodity of commerce suitable for substantial noninfringing use, even though sold with the knowledge and expectation that it will be used in an infringement, is excluded.

3. Is a test for determining invention set up?

What is invention has never been

* An example of contributory infringement is where X owns a patent covering a composition of matter containing components A and B which are old. Company Y sells component B to Company Z, knowing that Z uses the component to infringe the patent.

defined. The Supreme Court has decided that to be patentable an invention had to show a "flash of genius." Some courts have questioned whether inventions can arise out of corporate research laboratories with their teams of highly skilled researchers equipped to tackle all angles of a problem. H.R. 9133 would set up an objective test of invention, namely, a determination based upon the nature of the contribution to the art and not necessarily by the manner in which the contribution may have been made. It is intended to eliminate the "flash of genius" doctrine and any cloud on the patentability of research findings made by large industrial research laboratories.

4. Will pending patent applications be published if requested by the applicant?

Pending applications are now generally kept secret but the proposed bill would permit pending applications to be published by the Commissioner at the request and expense of the applicant or owner. Such a publication will have an anticipatory effect, in so far as other inventors are concerned as of its filing date, that is, the filing date would determine whether an invention by another for the same subject matter is new or capable of being patented. This provision is probably of interest to those who are primarily concerned with seeing that nobody else obtains a patent which might prevent their own operations. In a sense, it would be more effective than a publication in a periodical since ordinarily the date of actual publication of the periodical is the effective date against another application, not the date when it was submitted for publication.

The Patent Office now prints or publishes abstracts of pending applications only at the request of the applicant, and only if he is willing to abandon the application. The effective anticipation date, moreover, is not the filing date but the date of publication of the abstract.

In this connection, not to be overlooked is Public Law 776, which would establish a clearing house in the Department of Commerce for dissemination of technological information to American business. Procedure under this law may provide the "protection" of a publication of an invention now obtainable by publication of an abandoned application without the expense of a patent application.

5. A makes an invention jointly with B. However, B refuses to join A in the application, or cannot be found. Can A file the application?

Yes. The application may be made by A for both. A must show why B could not join. Likewise, if B was erroneously included as a joint applicant, he can later be dropped. Similarly, if a patent has been granted to a sole inventor when joint inventors are involved, or to joint inventors when only a sole inventor is involved, upon proper showing of the facts, the name of the joint inventor may be added or dropped.

6. Can a patent owner collect profits from a party who has infringed his patent?

The answer has been No since August 1946 and is not changed by the new bill. The patentee under present law is entitled to recover general damages to compensate for any loss suffered from the infringement, the award in no event to be less than a reasonable royalty for the use made of the invention by the infringer. However, the court in its discretion, can increase the damages up to three times the amount found or assessed. The court may also award attorney fees to the prevailing party. The patentee can't recover for any infringement committed more than six years prior to the beginning of his suit, or if he has not marked his product as patented together with the number of the patent, he can only collect for infringement continued from the time that he gave the infringing party actual notice.

7. A manufacturer has abandoned a patent application. Can he continue to mark his product "Patent Pending"?

No. Under the proposed change as soon as he abandons his application he must stop marking his article "patent pending," otherwise he will be subject to a $500.00 fine for every such offense. Any person can sue for this penalty in which case one-half of the penalty goes to the person suing and the other half goes to the U. S. Government. In general, any marking of an article as patented to deceive the public is subject to this penalty.

8. May a patented invention be made or used for experimental purposes without being liable for infringement?

Yes. The patentee can, however, sue those who make the invention for sale or sell it for this experimental use.

9. A launches a product after finding it does not infringe any patent. A patent is reissued on a subsequently filed reissue application with modified claims which are now infringed. Is he liable for infringement?

No. A and his successors in business would be able to continue the manufacture, use and sale in any amount of anything commenced, or for the manufacture, use, or sale of which substantial preparation was made before the filing of the application for such reissue, which did not constitute infringement of the original patent. He has acquired what are called "intervening rights."

10. An inventor makes an improvement or a modification of an invention for which he has previously applied for or obtained a patent. The improvement might not really amount to invention over his previous application, or patent. Can he obtain a patent on the improvement?

Yes. Under the new bill, so-called "patents of addition" would be granted for improvements made over a main patent. These patents of addition would expire simultaneously with the main patent. This is a practice that exists in many foreign countries. Some think it would solve the difficulties of so-called double-patenting. It might also encourage further development work on basic inventions and permit one to cover various phases of a basic invention. Investigating all angles of a broad invention may be spread over a long period of time. Yet, sufficient work has been done to indicate that the invention is generic and it is advisable to file an application thereon. New applications of addition on various new developments and modifications as they are made, which may be minor improvements over the basic patent and ordinarily would not be patentable thereover, could now be filed. However, some may find objectionable the implication of a lowering of the standard of invention since a patent of addition need not represent invention over the main patent as long as it comes within the scope of a claim of the main patent.

11. A vehicle of any kind—airplane, ship or land vehicle—of another country enters the territory of the United States, temporarily or accidentally, and on that vehicle use is made of an invention covered by a United States patent—does this constitute an infringement of the patent?

No, as long as the invention is used exclusively for the needs of the vehicle and is not sold in or used in the manufacture of anything to be sold in or exported from the United States. The Supreme Court has so held and the proposed bill would codify this principle.

12. The United States Government uses or manufactures an invention covered in a patent, or has someone do so in its behalf, without a license from the owner—can the owner recover any compensation from the Government?

Yes, but he can't enjoin the Government from using the invention. Under the present law the owner is restricted to filing suit in the Court of Claims, but under the proposed bill jurisdiction would also be given to the district courts. This, it is believed, will expedite the disposition of such suits.

(Continued on page 928)

Establishing an Industrial Radioisotope Program

by J. R. CARLIN and W. C. NUSBAUM
Tracerlab, Inc.

A TRACER STUDY MAY ELIMINATE years of conventional research and provide the answer to that impossible problem. Here are the requisites and factors to be considered in the application of this unique industrial tool.

CONTRARY to general belief the use of radioactive isotopes in practical scientific research was a reality decades before the blast at Hiroshima in August, 1945.

The first tracer applications of radioisotopes were performed during the early 1920's using naturally occurring radioactive material. Subsequently, when cyclotrons and other high voltage nuclear bombarding machines were constructed, similar experiments were performed using small quantities of artificial or man-made radioisotopes produced by these atom-smashers. Based on the gratifying results of these early applications which attracted considerable industrial attention, it was generally predicted that industry had found a new tool, one which would be put to intensive use once radioisotopes of the more important elements were obtainable in quantity at substantially lower cost.

Shortly after the war, the Atomic Energy Commission made products of its radioisotope production facilities at Oak Ridge available for private research. It published a catalog listing more than 100 obtainable radioisotopes, many at nominal cost.

Original predictions materialized mainly in the biological and medical fields. Industry in general hesitated to embrace this new tool. Of the approximately 12,000 shipments made from Oak Ridge to more than 750 individual research groups, less than 4% have gone to industrial establishments. Those industrial radioisotope programs which were initiated (chiefly in process and quality control) achieved promising success.

Most frequent explanation for this reluctance on the part of industry involves the initial cost of equipment, training of personnel and a vague fear of radiation hazards. Without minimizing these considerations, it is felt that a discussion of the steps required to establish an industrial radioisotope program will result in a better understanding of the problems inherent in such a project.

RADIATION CHARACTERISTICS

Radioisotopes are produced in several ways. When a stable chemical compound is subjected to intense neutron bombardment in an atomic pile, changes occur within the atomic nucleus in question and instability is induced. These unstable atoms can return to a stable state only by emitting radiation—either alpha, beta or gamma. Ultimately all radioactive atoms will return to a stable state. The transition time required is expressed as a half-life (time required for a quantity of radioactive material to lose half of its initial activity) because of the exponential nature of the decay. This half-life varies from a fraction of a second to millions of years depending upon the isotope. Until the moment when they emit their characteristic radiation, unstable atoms cannot be distinguished chemically from their stable counterparts.

Small quantities of artificial radioisotopes are also produced in cyclotrons by bombarding stable elements with accelerated nuclear particles or as by-products in the fission reaction of uranium or plutonium when these larger complex atoms are split into elements of lower atomic number. This fission takes place in the pile and considerable quantities of the radioactive products are available for use as tracers after separation from irradiated uranium and plutonium slugs.

Table 1 lists the physical characteristics of radiations emitted from isotopes. Note especially the marked differences in penetration qualities of the various types; beta and gamma particularly. These penetration characteristics are of prime consideration in the selection of a particular radioisotope for a specific application.

APPLICATIONS

"Packaged" applications of radioactive materials such as thickness gauges, liquid level meters, specific gravity gauges, static eliminators or radiographic techniques, are of secondary importance to the use of these materials as tracers. In tracer studies, the path of a particular element or compound is followed through a series of chemical and/or physical processes for the purpose of gaining an insight into the nature and mechanisms of the operations.

It is possible to replace a stable element in a compound with a radioactive element and thus tag the substance in question, since a radioisotope is chemically identical to its stable counterpart. These tagged compounds make their presence known by emitting radiation. Standard radiation detection equipment can reveal the presence of extremely minute quantities of radiation emitting isotopes. Dilutions of as much as one part per billion are detectable. It should be mentioned that tracer techniques are not expected to enter into day to day routine plant operations, but rather will be used as a device to solve special problems in the research laboratory or pilot plant, and occasionally in the full scale plant process.

Consider several typical tracer applications of radioisotopes:

1. Distillation Tower Efficiency—tag one component of mixture before distillation and radioassay distillate samples at various levels.
2. Mixing Efficiency—tag one component before mixing and radioassay random samples taken from final mixture.

TABLE 1—PRINCIPAL TYPES OF RADIATION EMITTED BY RADIOISOTOPES

Type	*Symbol*	*Description*	*Rest Mass*	*Charge*	*Penetration (Range in Air)*	*Ion Pairs per CM in Air*
Alpha Particles	α	Helium Nucleus. 2 Protons, 2 Neutrons	4	+2	2 to 9 cm for 3 to 10 Mev*	30,000 to 70,000 (Varies with distance from source)
Beta Particles	β	Electron Ejected from a Nucleus	$\frac{1}{1840}$	−1	160 to 2,000 cm for 0.5 to 5 Mev	150 to 40 for 0.5 to 5 Mev
Gamma Rays	γ	Electro-Magnetic Radiation	None	None	15,000 cm ½ value thickness for 1.5 Mev	1.5

*Mev—million electron volts.

3. Friction Studies—tag one surface and radioassay other surfaces after frictional contact.
4. Pollution Problems—tag waste components and radioassay suspected locations for deposition.
5. Detergent Effectiveness—tag soil or dirt components and radioassay after standard cleansing.
6. Fertilizer Studies—tag fertilizer components and radioassay plants to determine uptake.
7. Reaction Mechanism Studies—isomerization, alkalization, polymerization, catalyst action.

PROCUREMENT

To procure radioisotopes it is necessary to submit an application on Form #313, "Application for Radioisotope Procurement" which is available from the Atomic Energy Commission. The two prime requisites for approval are, the presence of a suitably trained person to assume responsibility for proper handling of the radioactive material and suitable instrumentation for health monitoring. Several weeks are usually required for clearance of the initial application. Subsequent requests for isotopes require only a few days and are processed on a routine basis. Upon approval of an application, several copies of Form #374, "Authorization for Radioisotopes Procurement," are issued to the applicant. The user then returns the original Form #374 together with his purchase order to the Commission or to one of the commercial suppliers now preparing and stocking various radio-elements in a wide selection of useful compounds. All requests for AEC catalogs, catalog supplements and application forms are addressed to:
U. S. Atomic Energy Commission, Isotopes Division, Post Office Box E, Oak Ridge, Tennessee.

Personnel can receive the proper training in several ways. Frequently it is desirable to send an interested company representative to the Oak Ridge Institute for their comprehensive one-month course designed to provide the trainee with a thorough theoretical and practical background for radioisotope work. Consulting services can be secured by: visiting AEC establishments at Brookhaven National Laboratory, (Upton, N. Y.); Oak Ridge National Laboratory; Argonne National Laboratory, (Chicago, Ill.), or Berkeley Radiation Laboratory, (Berkeley, Calif.); contacting organizations engaged in similar activities, or seeking the services of AEC approved consultants.

A potential user may desire to submit his own target material for irradi-

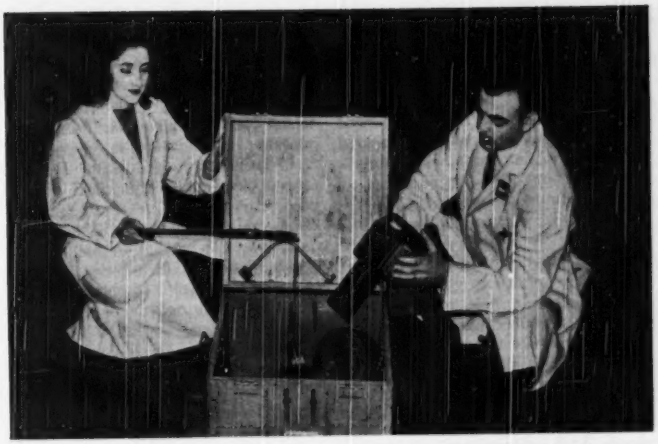


Fig. 1—MONITORING A RADIOISOTOPE SHIPMENT. Long tongs are a safety device used to handle sources of high intensity radiation.

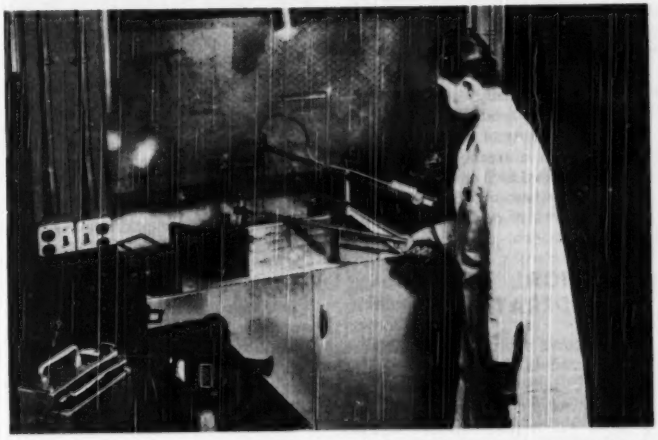


Fig. 2—SAMPLING THE RADIOACTIVE MATERIAL in hot-lab hood. Lead shield and remote mechanical pipette afford protection to the technician.

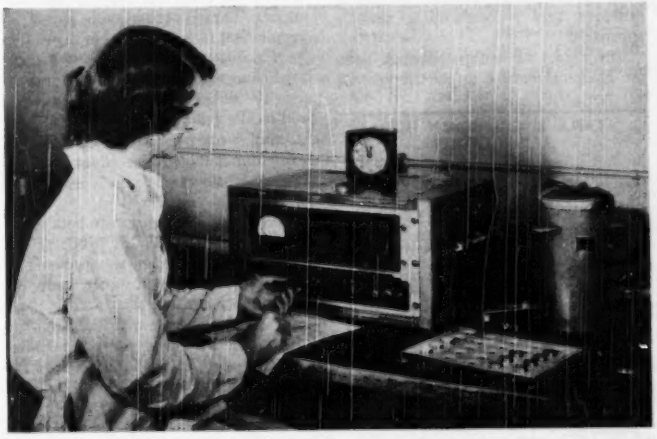


Fig. 3—MEASURING ACTIVITY OF THE SAMPLE. Basic equipment consists of scaler, geiger-muller tube in lead holder, timer, and sample tray.

ation and activation in the Oak Ridge pile. The same Form #313 is used. This is another service offered by the Commission and charges are made on a time basis: $43 per month, $22 per week. An example of the usefulness of this service is the project instituted by a pump manufacturer who sought a more resistant alloy for pump gears. With conventional techniques, approximately 1 to 2 years would be required for evaluation of the wearing qualities of each alloy, since the metal is worn away at an extremely slow rate and considerable time is required to obtain measurable changes in dimension or weight of the part studied.

Relatively small and constructed of materials easily activated by neutron bombardment, the gears were placed in the Oak Ridge pile for several weeks. The radioactivated gears were then test-run in an appropriate gear pump cycling a liquid in a closed system. Samples of the liquid were then periodically assayed for radioactivity. The amount of activity present in the liquid was measured quantitatively and then mathematically converted into weight of metal eroded. In this fashion greater sensitivity of measurement was attained with a tremendous reduction in time required for conventional methods. In some instances it is possible to measure wear of as little as one-millionth of an inch.

PRACTICAL CONSIDERATIONS

A practical approach for evaluation of the feasibility of employing radioisotopes including the selection of suitable instruments follows. That each problem will require separate analysis cannot be overemphasized. The USAEC has published a list of consultants available to discuss individual problems and recommend a suitable approach.

The choice of isotope depends upon the chemical nature of the element or compound to be studied. In many cases several isotopes of an element are available or frequently it is possible that the compound be "tagged" with radioisotopes of several different elements. Occasionally, when radioisotopes of an element are unavailable, it is necessary to substitute a radioactive element or compound similar to the substance in question. Final selection of the isotope will be determined by the most desirable half-life and radiation characteristics for solution of the specific problem and the physical conditions under which the radioassay measurements will be made.

Fortunately, most industrial problems suitable for tracer study lend themselves to a laboratory approach. The great degree of control inherent in laboratory procedures make them greatly preferable to other investigational operations. Only when plant studies cannot be simulated in the laboratory is it necessary to resort to the pilot-plant level or the manufacturing process.

The applicability of tracer work to a problem depends on five considerations. If any one cannot be satisfied, the use of tracers is disqualified:

1. AEC regulations.
2. Contamination.
3. Health hazards.
4. Detection or quantitative measurements of the tracer.
5. Disposal of final products and/or by-products.

Let us consider each of the above for broad manufacturing process studies.

AEC REGULATIONS

The AEC has established definite regulations concerning the industrial use of radioactive materials in products which find their way to the consumer. These regulations found in Supplement #1 (September 1949) to the Catalog and Price List #3 mentioned previously, state the level of activity in products which may be sold to the public. The regulations are different for beta emitting isotopes than for gamma emitting isotopes and are reprinted below:

A. *Beta ray emitters*

Proposals to incorporate beta emitting radioisotopes in products offered for sale can be approved if the radioactive substance is in insoluble form and incorporated permanently in inert material, and the product produces no more radiation than 0.3 REP* per week at the surface.

B. *Gamma ray emitters*

Products containing gamma emitters must meet the conditions for beta emitters. In addition, products stored in warehouses must have proper monitoring to show that the radiation level is in accord with the limits stated in the handbook, "Safe Handling of Radioisotopes," issued by the National Committee on Radiation Protection.

In other words, if the isotope is either in a soluble form or cannot be incorporated permanently in an inert material, tracer techniques cannot be employed unless materials are confined to the laboratory. If the problem is sufficiently urgent, however, it might warrent a limited production run of products not permitted to reach the consumer. It is desirable in the light of these regulations to select a short half-life isotope, since storage of the material over several half-life periods results in almost complete loss of activity.

CONTAMINATION

Contamination is an important consideration from the standpoint of personnel protection and the reproducibility of experimental data. The same instruments used for low level health monitoring are called upon for locating regions of contamination and solvents used for cleansing these surfaces are decided by the chemical nature of the contaminant. A useful device is to cover work areas with strippable paint or sheets of expendable absorbent fibrous materials. The contamination problem is simplified with short half-life radioisotopes, since the rapid decay usually prevents large accumulations of active materials.

HEALTH HAZARD

In all cases it is advantageous to use a beta emitter from a health hazard viewpoint. Beta particles (Table 1) exhibit a very limited range and therefore can easily be totally shielded. Depending upon the particular energy of the beta emitter used, the shielding requirements may vary from the thickness of ordinary writing paper to ¼ inch glass. Gamma, like X-rays, possesses much greater penetration characteristics. Lead screening and distance provide the most effective means of protection.

Three hundred millieroentgens per week has recently been announced as the established radiation tolerance dosage rate, Although the 300 millieroentgens per week figure contains a substantial safety factor, tracer laboratories invariably work well below this level. Film badges and pocket dosage meters are available from several com-

TABLE 2—COMMONLY USED RADIOISOTOPES

Isotope	Half-life	Energy of Emitted Radiation in Mev β	Energy of Emitted Radiation in Mev γ	Cost of Minimum Shipments
I-131	8.0 days	0.315 0.600	0.638 0.368 0.283 0.080	$1.00/mc
P-32	14.3 days	1.712	....	1.10/mc
C-14	5100 yrs.	0.154	....	36.00/mc
Na-24	14.8 hrs.	1.39	1.38 2.76	12.00/15 mc
S-35	87.1 days	0.169	....	2.40/mc
Ca-45	180.0 days	0.25	....	4.00/mc
Fe-59	46.3 days	0.26 0.46	1.10 1.30	33.00/mc
K-42	12.4 hrs.	2.04 3.58	1.51	12.00/125 mc
Co-60	5.3 yrs.	0.31	1.16 1.30	33.00/20 mc
Sr-89	55.0 days	1.5	....	33.00/1.5 mc

Note: mc—millicurie defined as 3.7×10^7 disintegrations/sec.

Data from Isotopes Catalog & Price List No. 3 of USAEC.

* REP—Roentgen Equivalents Physical, a measure of ionization energy.

mercial organizations for personal monitoring. Since these devices indicate total accumulated exposure, radiation rate meters should be used when high level work is performed.

DETECTION

The manner in which quantitative measurements are performed is determined by the physical nature of the manufacturing process. The detection problem can be divided into two clearly defined categories. One, where the desired answer concerns a rate or flow and the second where "grab samples"* can be taken into the laboratory for analysis. In the former category measurement is carried out directly in the process using a rate-meter type of instrument. This means that the detector must be readily accessible to the radiation. When the tagged material is wholly enclosed, as within a pipe or other closed conveyor, a high penetration gamma emitter might be more desirable. Such enclosures would normally absorb most beta radiations. It is preferable to use a beta emitting isotope whenever the process is sufficiently open at the point of detection.

Although cost for counting rate instrumentation is low compared to other types of detecting equipment, the poor accuracy associated with such equipment requires the use of larger quantities of radioactive material. This increases disposal and health problems proportionately. If samples can be taken into the laboratory for analysis, the grab sample method is to be preferred.

LABORATORY STUDIES

Frequently, ordinary laboratory facilities with a few modifications can be utilized. The laboratory should be divided into three sections, preferably three separate rooms. These divisions are: high level or storage, medium level or processing and low level or sample counting. Physically the storage of isotopes should be as far from the counting room as is conveniently possible to keep the background count (in the counting room) at a low constant level, and so that personnel will not be exposed to high levels of radiation while doing routine work. All three rooms should be designed for easy decontamination. Floors should be smooth with a minimum of cracks and corners. Highly waxed linoleum is excellent because it can be easily removed when necessary. Table tops must be smooth and non-porous. Wood is not acceptable, stainless steel is far better. Large stainless steel pans find frequent use and absorbent paper like Kimpack, with a waterproof backing may be used to cover working areas. In case of spillage the paper can be disposed of in a container designated for storage of radioactive waste.

Special storage space is needed only when gamma emitters or very large quantities of high energy beta emitters are used. This space should be equipped with remote handling tongs and a remote pipetting device for initial dilution. Lead containers used for gamma emitters, may also be used for betas, and an ionization chamber type of detector should be available when Oak Ridge containers are opened.

The processing laboratory should be equipped with a low level monitor of the geiger tube variety for determining contamination of glassware, etc.

If long half-life isotopes are used, a hood is essential to prevent internal accumulation of isotopes by inhalation (Figure 2). This hood should possess a separate duct exclusive of any other ventilation system, and should exhaust to the outside air, remote from intake vents or other means of re-entering the building.

Instrumentation for the counting room depends upon the nature of the radiation, which can be divided into three groups:

1. Strong pure beta emitters, like P-32
2. Gamma emitters, like Co-60 and Na-24
3. Weak pure beta emitters, like C-14 and S-35

The basic equipment, scaler and geiger-mueller tube in a lead shielded sample holder, shown in Figure 3 can be used for all three groups, however, more efficient counting for Groups 1 and 3 can be obtained by using specialized geiger tubes. High efficiency gamma counters result from special gas fills and cathode materials. Windowless flow counters, (where the sample is put directly into the counter) are used for low energy beta emitters as they eliminate radiation absorption by the geiger tube envelope.

Basic instrumentation needs are listed below with existing prices. Costs may usually be doubled to estimate the overall cost of setting up facilities.

TABLE 3—PRICE RANGE OF TYPICAL INSTRUMENTAL REQUIREMENTS

1 Scaler with timing device		
From $	430. To $	750.
1 GM tube mount	60.	200.
1 GM tube	15.	350.
Calibrated Sources	15.	50.
1 Laboratory monitor (GM tube)	215.	300.
1 Portable radiation survey meter (ionization chamber)	200.	300.
Lead bricks and containers (for gamma only)	200.	300.
Remote accessories	35.	120.
Pocket dosage meters, film badges, planchets, etc.	150.	300.
From $1,320.	To $2,670.	

In general, similar problems and precautions are encountered in pilot-plant studies as manufacturing process studies. Instruments of high sensitivity should be used for pilot-plant-scale measurements to reduce the amount of required activity. As pilot-plant products will not reach the consumer, AEC regulations governing consumer products are entirely replaced by waste disposal regulations.

DISPOSAL OF FINAL PRODUCTS

AEC regulations covering this aspect of the problem have already been considered for products reaching the consumer. Many by-products do not find consumer use and would normally be sent to regular industrial waste disposal facilities. If these facilities are inadequate for isotope disposal, new arrangements are necessitated. One of the following procedures can be followed, depending upon the quantity, chemical nature, and radiation characteristics of the material to be disposed of:

A. Chemical separation and/or storage until sufficiently decayed; then disposal in normal fashion.
B. Dilute with inactive carrrer to satisfy Bureau of Standards specifications of 10^{-7} microcuries per cc.

This disposal operation may be extremely perplexing and of a magnitude that would make a tracer study prohibitive. Again, the use of minimum quantities of short-lived isotopes commensurate with desired detection accuracy offers advantages.

The considerations discussed in this article are a representative guide to the many possible arrangements and applications of radioisotope tracer work. It cannot be emphasized too strongly, that the specific nature of the problem under scrutiny will determine the requirements of the tracer approach. In the absence of other less complex investigational devices, radioisotopes can be profitably called upon for the solution of many industrial problems.

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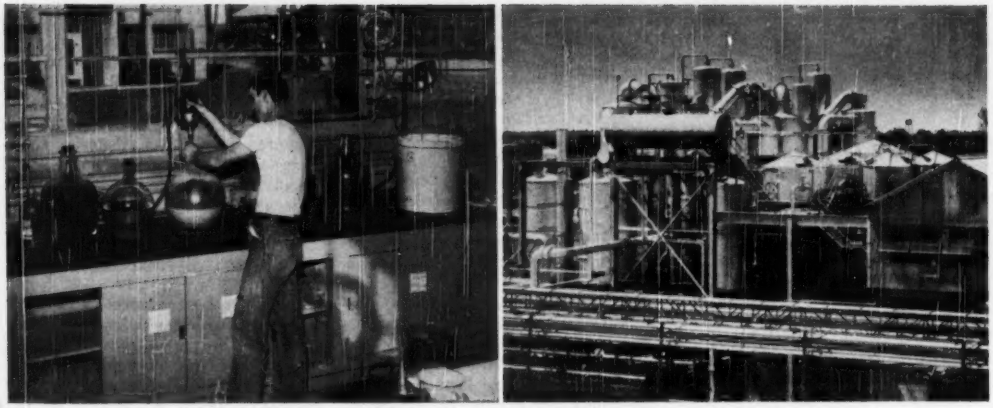
* Small individual batches.



"THE BIGGEST MONEYMAKERS are those which grow gradually from many small . . . experiments."

Successful Research Pays Off

by W. A. LaLANDE, Manager, Research and Development
Pennsylvania Salt Manufacturing Co., Philadelphia, Pa.

HOW PROFITABLE CAN ONE EXPECT a successful research project to be? Down-to-earth case histories of several diverse developments show that research—expensive as it has become these days—is still a high-return investment.

EVERYONE knows about the glamor and romance of research —about how coal, air and water can be made magically into a beautiful and useful plastic, and about how superhuman scientists working with instruments of wondrous complexity and using mathematics, physics and structural organic chemistry are able, after years of brilliant research, to produce cheaply and in large quantities a wonderful drug hitherto found only in nature in microscopic quantities.

But the research results which are so spectacularly advertised and written about are not produced overnight. The biggest moneymakers are those which grow gradually from many small and generally—except to the researcher—dull experiments. Little by little, the big achievement develops, the job takes a long time, and the end result is often just an anticlimax.

TAKES TIME AND MONEY

Successful research requires careful planning, understanding backing, and a patient and often laborious approach to find the needed answers. If you realize that there are many failures as well as successes, and if you accept the thesis that a successful research and development group is one whose successes, though far fewer in number than its failures, nevertheless pay for themselves, for all the failures, and still produce a good profit for the company, you will see modern industrial research as it really is.

What does a research and development division do that can pay a profit to the company which supports it? Its functions can be categorized as follows:

1. New products.
2. New processes.
3. Improved products.
4. Improved processes.
5. Technical assistance to Sales Manufacturing, Legal and Advertising Divisions.
6. Advice to Management in planning, acquiring, and predicting.
7. Training of personnel for other divisions of the company.

The first four are the obvious moneymakers, but the first two receive the most publicity. A new product with remarkable properties and immediate large-scale usefulness is something everyone can understand. Similarly, a new process for making a well known product in a different way, and more cheaply with new-fangled technics, is also likely to receive the glamor treatment.

But very profitable and useful, in an always dependable sort of way, are the *improvements* which the research man makes in products and processes. These accomplishments, which effect very important savings in manufacturing costs and increases in sales volume, very seldom reach the front page, but they do show up convincingly on the credit side of the ledger.

The remaining three functions of a research and development division are not as obviously important, nor are their benefits to the company as tangible nor as dramatic as the preceding ones. They take the form of services which do not result in immediate and always obvious financial gains to the company.

Every experienced executive knows however, that good, sound, long-range advice to management on new ventures, cheerful and helpful service to a customer in trouble, expert technical opinions to the legal division and the transfer of a well-trained man to manufacturing or sales, are accomplishments, and do, in the long run, mean real dollars of profit to the company.

Because of the nature of a business, it is possible that the chief function of its research and development division will be limited to a combination of only a few functions in this list. There are several prosperous and progressive companies whose research and development divisions' only contributions are in product and process improvement and in technical assistance to sales. No research and development organization justifies its existence exclusively on the putting forth of new products.

In attempting to accomplish its job, how much does the research and development organization of a progressive company spend per year? Needless to say, the amount varies from company to company and depends on the vitality of the company, its size, its type of business, and its degree of diversification.

DO YOU SPEND ENOUGH?

A highly diversified company must spend more for research than an organization with the same yearly gross sales obtained from a smaller number of closely related products. This is obvious since the more diversified company must support research effort in many unrelated fields, i.e., it must maintain several research organizations under one roof, and the savings possible through close integration of effort on a smaller number of related problems is not possible.

In the United States, the average research expenditure, by industry in general, for research and development work is approximately 1.6% of gross sales. The petroleum industry, however, spends only about 0.7% of its huge gross income on research and development work, while the figure for the ethical pharmaceutical manufacturers is 4%-5%. Some chemical manufacturers spend as much as 5%, but the majority of those for which figures are available spend an amount which averages just below 3%.

Usually a chemical manufacturer feels satisfied if he is in the range 2%-3%. It is a fact, however, that the larger and more progressive companies spend more, and the average for organizations of this type would be in the range 3%-4%. Thus a chemical business which grosses $100 million per year might have a research and development budget of from $2 million to $4 million. There are companies, of course, which operate research and development divisions with budgets outside both extremes of the range.

It is not clear how the 2% or 3% or 4% of gross sales figure has been arrived at. Everyone seems to know about it, and many technical men and business executives accept it as gospel.

TABLE I—NEW PRODUCT: ORGANIC INSECTICIDE

1. Cost of laboratory research	$178,000
2. Cost of pilot plant work	$137,000
3. Cost of developing markets	No data
4. Commercial plant investment	$2,500,000
5. Elapsed time from start of lab. work to beginning of production	5 years
6. Expected life of product or process	12–15 years
7. Annual sales or savings	$4,000,000 (sales)

TABLE II—NEW PRODUCT: POLYMERIC MATERIAL

1. Cost of laboratory research 2. Cost of pilot plant work	$1,825,000
3. Cost of developing markets	No data
4. Commercial plant investment	$15,900,000
5. Elapsed time from start of lab. work to beginning of production	9 years
6. Expected life of product of process	15–25 years
7. Annual sales or savings	$12,500,000 (sales)

TABLE III—IMPROVED PRODUCT: OINTMENT (FOR SKIN DISEASE)

1. Cost of laboratory research	$8,000
2. Cost of pilot plant work	$2,000
3. Cost of developing markets	$8,000
4. Commercial plant investment	None
5. Elapsed time from start of lab. work to beginning of production	1¾ yrs.
6. Expected life of product or process	10 years
7. Annual sales or savings	$350,000 (sales)

TABLE IV—IMPROVED PRODUCT: EXPLOSIVE MATERIAL

1. Cost of laboratory research 2. Cost of pilot plant work 3. Cost of developing markets	$30,000
4. Commercial plant investment	$14,000
5. Elapsed time from start of lab. work to beginning of production	3½ yrs.
6. Expected life of product or process	10 yrs.
7. Annual sales or savings	$120,000 (sales)

TABLE V—NEW PROCESS: PURIFICATION OF A VEGETABLE FOOD PRODUCT

1. Cost of laboratory research	$34,000
2. Cost of pilot plant work	$240,000
3. Cost of developing markets	None
4. Commercial plant investment	$1,200,000
5. Elapsed time from start of lab. work to start of production	7 years
6. Expected life of product or process	20–30 years
7. Annual sales or savings	$350,000 (savings)*

* On annual sales of $2,250,000

TABLE VI—NEW PROCESS: CATALYTIC METHOD FOR ORGANIC CHEMICAL

1. Cost of laboratory research	$65,000
2. Cost of pilot plant work	$24,000
3. Cost of developing markets	None
4. Commercial plant investment	$350,000
5. Elapsed time from start of lab. work to beginning of production	4 years
6. Expected life of product or process	"Permanent"
7. Annual sales or savings	$700,000 (sales)

TABLE VII—IMPROVED PROCESS: PETROLEUM REFINING METHOD

1. Cost of laboratory research	$65,000
2. Cost of pilot plant work	$135,000
3. Cost of developing markets*	
4. Commercial plant investment	$750,000
5. Elapsed time from start of lab. work to beginning of production	10 years
6. Expected life of product or process	15 years
7. Annual sales or savings	$120,000** (savings)

* Borne by licensing agent.
** Not including royalties rec'd from licensees.

TABLE VIII—IMPROVED PROCESS: MANUFACTURE OF ORGANIC CHEMICAL

1. Cost of laboratory research 2. Cost of pilot plant work	$14,000
3. Cost of developing markets	None
4. Commercial plant investment	$30,000
5. Elapsed time from start of lab. work to beginning of production	7 months
6. Expected life of product or process	10 years
7. Annual savings or sales	$90,000 (savings)

It may be that the many have followed the example of the original few who just happened to spend that amount because it was what they thought they could afford; or it may be that the amount represented by the 2%-4% is a "natural" which measures the amount experienced, careful, and profit-sensitive business men know intuitively that it is safe to gamble. No one will deny that the more aggressive form of research toward new products and processes is a type of gambling but it is certainly calculated, "educated" gambling.

SPEND IT WISELY

Whatever the amount allocated by management for research and development work is, it is the research directors' job to see that it is spent in the right way. Projects must be carefully selected, adequate manpower assigned to each project, and objective, critical judgment applied to the projects as they progress.

It is a pointless waste of money to spread effort over more projects than can be efficiently handled with the staff the budget can support. The research director must have the final word in deciding how many men should be assigned to a project to produce an answer within a reasonable time. Knowing how much each man costs and what supplies he needs, he can estimate easily how many projects his budget will permit him to work on during the year.

It is instructive to consider research expenditures in terms of manpower. It is interesting for comparative purposes to divide the total research and development budget, including overhead, by the number of proffessional technical men on the staff. This gives, of course, the annual cost of maintaining one such man. The range of figures obtained for a large group of chemical companies by this simple calculation is revealing: $9,000 to $30,000 per year per technical graduate. Incidentally, some companies divide the total budget by the number of men, professional and non-professional, actually doing technical work. In these cases, the figures obtained are, of course, lower. The $9,000 figure seems impossibly low under today's conditions; a good average figure would be about $16,000. Most of the companies are in the range $12,000 to $20,000.

Another important part of the expense of doing research and development work is the cost of laboratory and pilot plant buildings and their original equipment. Since 1945, 124 research and development laboratories have been built and equipped. This includes new buildings, additions, and replacements. The total cost of 78 of these (figures for the others have not been published) was $117,900,000, or an average cost of $1,500,000. The cost per square foot was about $20-$25, and the total area of floor space (for the 78) was approximately 4,700,000 sq. ft.

HIGH COST GIVES PAUSE

Viewing such figures, the company president often asks, "How can I evaluate my research and development division? How can I tell if I am getting my money's worth?"

Several systems have been proposed for evaluating research, and some of them even employ mathematical formulas. Some of them may work for the companies they were designed for; but no system or method is generally applicable, and even the few in use are under suspicion by their proponents. Actually there is one method that does work, and that one depends on the research and development division's giving so much to the company in the way of tangible earnings that not even the treasurer wonders about the expenses, and the president never thinks to ask for an evaluation!

That kind of vindication is found in the following case histories, selected from a large number of successful research developments, which illustrate the four most important, or at least most tangible, types of industrial research accomplishment. (It would be more interesting if the products and processes and their originators could be identified, but most of the information has been supplied by other companies with their permission conditional upon not revealing the products or processes nor the companies commercializing them.)

The left-hand columns of all the tables in this series are the same. The group of individual entries constitute the kind of information which tells the story, in time and dollars, of a successful project. An unsuccessful project should be recognized as such in the first phase, and certainly by the third. It would be disastrous, of course, to decide that a project was not a success after completing point four.

PRODUCT PROFITS

Some of the tables lack one important figure: the profit made on the job. This kind of information is understandably difficult to obtain and generally impossible to quote publicly. This case and all the others in the series are regarded by their contributors as at least fair profit-makers and well worth the effort and money.

Table I gives the data for a chemical which, although new at the time of its introduction, quickly became an important insecticide and, for the type of highly competitive product it is, a good moneymaker. The laboratory research and pilot-plant investments are relatively small in this case. The commercial plant investment is fairly high, indicating that much new equipment was required and that idle plant was either not available or, if available, unsuited for the purpose. The total time of five years from idea to commercial production is relatively short for a moneymaker of this type. The profit on this item is understandably considered very satisfactory by its owner.

Table II shows another new product-type material. Here we have a major research and development project which required the expenditure of almost $2 million for laboratory research and pilot plant, and an undisclosed but substantial amount for market development. In this case the investment for plant facilities was very large, but the estimated long life of the product and the sales which had been forecast supported the expenditures. This has proved to be a highly successful product and justifies in every way the patience and faith indicated by the 9 years' lapse from laboratory to the start of commercial production.

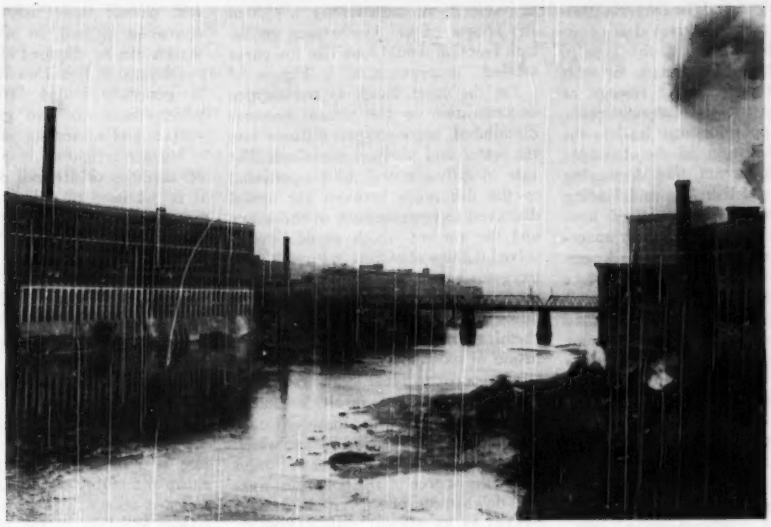
IMPROVEMENTS PAY OFF

The third table gives data for a highly successful improved product developed and marketed by a nationally known ethical pharmaceutical manufacturer. It is a good example of how a small expenditure for research leads to a product which required very little proving in pilot plant and no investment for manufacturing facilities. The expenditure for market development was also small. This is a project which moved fast; less than 2 years after the laboratory work had begun, the product had started on a fairly long commercial life and was grossing at the rate of $350,000 per year. The profit in this case was quite high.

Table IV shows how one company improved on an explosive which allowed it to enter the field with a product which was better than competitive materials. In this case the sales volume was small, but the small outlay for the first three steps and for manufacturing equipment justified the expenditure. The profit on this item is very satisfactory, and the life expectancy of the product is good.

NEW PROCESSES CUT COSTS

The fifth case history illustrates what can happen when an entirely new process is substituted for the manufacture of an old product. Here a good



A CI REPORT ON

STREAM POLLUTION

Industry and government have joined forces in the battle on stream pollution. But there are many technical and legal aspects of the problem to be considered.

Its Prevention and Control

by MELVIN NORD
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THE PREVENTION of stream pollution by industrial wastes parallels in some respects the prevention of atmospheric pollution, but differs very greatly in other respects. As in the case of atmospheric pollution, there are two possible means available—dispersion and treatment. The principles of dispersion are basically similar in both types of pollution, i.e. disperse the contaminant to as low a concentration in the receiving reservoir as possible.

TYPES OF STREAM POLLUTION

Before a waste can be treated, it is necessary to consider its effect on the stream. Broadly speaking wastes can be classified according to whether the pollution is physical, chemical, or bacterial.[1, 2]

The term "physical pollution" refers to the deposition of suspended solids on the bed and banks of a stream, the deposition of a scum of oily or solid materials floating on the surface of a stream, or the creation of turbidity by solids remaining suspended in the stream. This type of pollution can be controlled by mechanical means, such as screening, filtration, or oil skimming.

The term "chemical pollution" refers to the presence of substances which cause undesirable chemical or biochemical effects. Thus, the presence of substances which are toxic or otherwise injurious to fish, of acids or dissolved salts which render the water unsuitable for domestic or industrial use, or of organic compounds such as phenols which cause the water to have an undesirable odor, are examples of chemical pollution. Acids, such as occur in mine drainage and waste pickle liquor from steel mills, are toxic and corrosive, but their toxicity is also somewhat advantageous, since it reduces bacterial pollution. It has even been claimed that this latter effect more than outweighs the disadvantages of the presence of acidity in certain streams.

Another type of chemical pollution is the presence of any organic material which can be oxidized biochemically in the stream through the agencies of the

dissolved oxygen and the bacteria present in the stream. A great deal of attention has been given to this type of pollution, since it is present in most wastes, whether domestic sewage or industrial wastes. In extreme cases, this type of pollution may lead to the complete exhaustion of the dissolved oxygen in the stream, thus destroying green plant and fish life, and leading to the formation of unoxidized low-molecular weight compounds by anaerobic decomposition, such as hydrogen sulfide, ammonia, etc., which produce odors of putrefaction.

The amount of oxygen required to permit a polluted water to become completely oxidized biochemically is the "biochemical oxygen demand" (B.O.D.). This is determined by initially measuring the dissolved oxygen content of a mixture of the sample and pure water, and measuring it again after 5 days of incubation at 20° C. The oxygen thus consumed is the B.O.D. If the dissolved oxygen content of the stream is not too badly impaired, organic wastes of this type are not offensive, as they become decomposed in the stream to oxidized substances, which are odorless and are eventually removed from the stream as gases or solids. That is to say, the stream is able to "purify" itself of these contaminants. If, however, the load on the self-purifying ability of the stream is too great, these materials must be removed from the effluent or oxidized biochemically before disposal of the affluent.

The third type of pollution is "bacterial." This refers to the presence of pathological bacteria in the effluent, which affect the utilization of the water for domestic purposes or for bathing. This type of pollution is more common in domestic sewage than in industrial wastes, and will not be discussed further in this paper.

Table 1 summarizes the effects of some of the more common contaminants upon the quality of water.[4]

STREAM SANITATION

Insofar as oxidizable organic wastes are concerned, a process of self-purification can occur in streams by biochemical oxidation.

When waste effluent having a high B.O.D. is permitted to enter a stream, the biochemical oxidation reaction begins to consume dissolved oxygen from the stream. Since this reaction is slow, generally being only about 68% complete in 5 days at 20° C., it is apparent that the dissolved oxygen content of the stream tends to become reduced gradually as the water moves downstream. If the distance downstream be measured in days (based on the average velocity of the stream), a plot of the course of the biochemical oxidation reaction would look like the curve labeled "deoxygenation" in Figure 1.[5]

On the other hand, as the oxygen concentration in the stream becomes diminished, more oxygen diffuses into the water and becomes dissolved. The rate of diffusion will be proportional to the difference between the actual dissolved oxygen content of the water and the amount which would be dissolved if the water were saturated with oxygen. Since the dissolved oxygen content tends to decrease as the water flows downstream (because of biochemical oxidation), the rate of diffusion of oxygen from the air into the stream also increases, as shown in Figure 1. The net result is that a minimum occurs in the dissolved oxygen content at a "critical" point which may be a considerable number of miles below the source of the pollution. Further downstream, however, the stream returns to its normal, pure condition. An increase in temperature speeds up the biochemical reaction and reduces

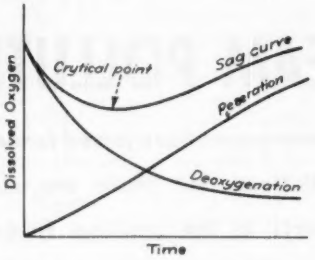

Figure 1.—Time means deoxygenation.

the solubility of oxygen in water. Thus, in warm weather, the critical point is moved closer to the source of pollution than in cold weather.

It will be observed that the portion of the stream which is affected to the greatest extent is always substantially downstream of the source of pollution. This aggravates the situation, since it is more difficult (for private citizens) to place the blame on the offender, and since the offender himself is not harmed by his own pollution.

Experiments are now in progress in which a polluted stream is being reaerated by bubbling air into the stream 6 miles downstream from the source of pollution, at the "critical point." Although not conclusive as yet, the results appear promising.[6]

DISPERSION OF WASTE EFFLUENTS

Industrial liquid wastes are generally poured into streams. Where sewers are available and where the city will permit their use, they can of course be utilized. In other cases, the wastes can be disposed of on land.

Disposal of liquid wastes on the land is generally called "irrigation," of which there are two general types: surface and subsurface irrigation.[7]

Surface irrigation is one of the oldest methods of disposal of wastes, but it is not used to any great extent in this country. It involves distributing the waste over a large land surface or into furrows. In some places crops are grown between the furrows, but this is not permitted by many American health authorities. The wastes undergo the same biochemical reactions in the soil as in a stream, provided air is permitted to enter the soil along with the water. This usually requires directing the waste to different portions of the field at intervals. Surface irrigation is practiced only where land is cheap and highly permeable, and where water is scarce. The scarcity of water makes pollution of the streams especially offensive, and the irrigation of the land may sometimes be used to advantage in the growing of crops.

In subsurface irrigation, the wastes are applied to the subsoil through open-joint tile lines, following a septic tank. Salt brines from oil wells and other liquid wastes have also been disposed of by means of wells. The wells are driven into a permeable rock formation in which any water present is not suitable for any known use. The wells must therefore extend below the source of drinking or industrial water.[8] In some states, permission of state authorities is necessary before this can be done. Besides the necessity of locating a proper formation having sufficiently high permeability, it is also necessary to remove suspended solids from the water. If the water reacts with the metal pipe or with the underground rock, the process is not feasible. At present, this method of disposing of wastes is standard practice in the petroleum industry, but has not been used appreciably in other industries.

The most usual way of disposing of liquid wastes is by dilution in a flowing stream. If the volume of pure water in the stream is large enough to handle the effluent without causing any substantial pollution, the only problem is to achieve the greatest possible dilution immediately on dispersion of the waste in the stream. The proper point of discharge and the proper depth must be chosen so as to permit the maximum amount of mixing.

In small streams, it is generally best to place the outlet pipe on the bottom of the stream, extending as far across the stream as desired. The pipe is per-

forated at intervals, so that the waste is discharged along a substantial distance; turbulence of the stream will generally be sufficient to provide adequate mixing. In the case of large, navigable streams, which are usually slow-moving near the shore, it is advisable that the pipe run along the bottom far out enough to reach a channel where there is turbulence. The pipe should then be turned upward and fitted with a cross-head with outlets facing in four directions. In this way the fish life, which normally inhabits the regions near the shore, will not be injured.[9]

TREATMENT OF WASTES

The methods of treatment of wastes are conveniently divided into the following categories: mechanical separation, hydraulic separation, chemical coagulation, chemical and physical reaction, disinfection, and biological reaction.[10]

Mechanical separation: In this category screening, comminuting, and filtration find employment. Screens are used to remove floating solids and the larger particles of suspended materials. The coarsest screens, consisting of bars spaced at 2 inch intervals at an angle of 30 to 60 degrees with the horizontal, remove large pieces of debris from the water in order to protect the water pumps. The screens or "racks" are cleaned by raking at intervals of about an hour. The screenings are disposed of by burying or by feeding to an incinerator.

Medium screens, with openings of ½ to 1½ inch, are used to protect pumps and to remove floating materials which form a scum in sedimentation basins.[11] They may be mounted in the same way as coarse screens, or they may be moving screens; the latter are always mechanically cleaned. While coarse and medium screens remove only the floating solids, moving fine screens may be used to remove suspended solids. This is not generally the best way to remove suspended solids, however, settling tanks being preferable.[12] However, fine screens are useful where removal of a small portion of the suspended solids is the only treatment necessary before disposal of the waste to a stream or a sewer.

In recent years, comminuters or shredders have been replacing screens. These may be a swing-hammer type shredder or a slotted revolving drum with cutting knives mounted on the drum. In each of these devices, the flow passes through the comminuter, where it is shredded and screened in a single operation.

The so-called "rapid filtration," which is an ordinary mechanical separation, must be distinguished from trickling filtration, in which biochemical oxidation occurs. The latter process is discussed later.

Rapid filtration is used to remove suspended solids, generally as a finishing operation after the waste has been settled or been subjected to chemical coagulation. A bed of sand, magnetite, or pulverized coal is generally employed as the filtering medium. The polluted water may pass either up or down through the bed, as preferred. When solids accumulate in the bed to an extent sufficient to restrict the flow through the bed, backwashing of the bed is employed.

The filters are constructed in a manner quite similar to those used in water-purification plants. Continuous vacuum filters have also been used in waste treatment. Their use is generally limited to industrial wastes having a high enough content of solids to build up a suitable filtering mat on the rotating drum. It is possible, however, to form a mat with paper pulp which has been added to the waste. Vacuum filters are extensively used in the dewatering of sludge removed from sewage.[13]

Hydraulic separation: This category includes settling, sedimentation, oil skimming and flotation. Where the waste contains a considerable amount of sand and grit, it can be removed in a settling chamber. This is a long, narrow tank containing a storage area at the bottom for settled solids. The size and shape of the tank are generally such that a velocity of about 1 ft. per second is maintained for a period of about 1 minute. During this time the grit settles out, leaving the suspended solids still in the water. The grit is generally removed intermittently by hand. Settling is not generally required in the case of industrial wastes, but is commonly employed in municipal sewage systems in which runoff and street drainage are combined with domestic sewage.[14]

Sedimentation is the standard method for removing suspended solids and protecting the stream against sludge deposits.[15] This process is essentially the same as the settling process described above, except that much more time and slower linear velocities are necessary in order to permit the settling of finely divided particles. Linear velocities as low as 1.5 ft. per minute are generally required, since any turbulence will tend to keep the solids suspended. Because of the slow settling rate of finely divided particles, detention times of ½ to 2 hours are required. If the waste is to be discharged under favorable dilution conditions, the shorter detention times are possible. If it is desired to reduce B.O.D. substantially by sedimentation,

TABLE 1—EFFECT OF COMMON CONTAMINANTS IN WATER

SUSPENDED MATERIALS	
Bacteria	Certain types causes disease, others cause the stream to purify itself
Algae, Protozoa	Odor, color, turbidity
Suspended Solids	Turbidity
Oil	Scum on surface
DISSOLVED MATERIALS	
Salts	
Calcium and Magnesium Bicarbonate	Alkalinity, hardness
Calcium and Magnesium Carbonate	Alkalinity, hardness
Calcium and Magnesium Sulfate	Hardness, boiler scale
Calcium and Magnesium Chloride	Hardness, corrosive to boilers
Sodium Bicarbonate	Alkalinity
Sodium Carbonate	Alkalinity
Sodium Sulfate	Foaming in boilers
Sodium Fluoride	Mottled enamel of teeth (in high concentrations)
Sodium Chloride	Taste
Acids	Corrosive to metals, toxic, reduces bacterial pollution
Iron Oxide	Taste, red color, corrosive to metals, hardness
Manganese	Black or brown color
Vegetable Dyes	Color, acidity
Gases	
Oxygen	Corrosive to metals, necessary for fish life and for stream self-purification
Carbon Dioxide	Corrosive to metals, acidity
Hydrogen Sulfide	Odor, acidity, corrosive to metals

the longer times are necessary. An average sedimentation basin is about 10 ft. deep and 100 ft. in diameter. Inlets and outlets on the sedimentation basin must be designed so as to avoid high local velocities and short-circuiting across the basin. Mechanical collection and discharge of the accumulated sludge are provided in all the large sedimentation tanks, [16, 17]

The removal of oil from water is essentially the same in principle as the process of sedimentation described above, except that it operates in reverse. Instead of the suspended particles settling to the bottom, suspended oil droplets rise to the surface in this case, where they are removed by skimming. Oil skimming basins are generally rectangular in cross-section, and have detention times of about 10 minutes.[14] A typical size would be 20 ft. wide and 8 ft. deep. The inlet should be designed so as to reduce the inlet velocity and distribute the flow across the width of the tank. An oil retention baffle is placed near the outlet end. The oil is automatically collected through an overflow pipe. It is desirable to provide a secondary section which is similar to the primary section described above, in order to complete the removal of the oil.[18] Emulsions cannot be separated by ordinary oil skimming methods. They may sometimes be "broken" by heating; sometimes they require chemical treatment.[19]

The skimming of oil and grease can sometimes be aided by using the principles of flotation. In this process, air is bubbled through the liquid. Substances which are heavier than water can also be "floated" if they become attached to the rising air bubbles. Flotation agents may be added in order to promote this adherence.

Chemical coagulation: Chemical coagulation is used as an aid to sedimentation. By the addition of certain chemicals, colloidal particles can be made to agglomerate into larger "flocs," which then settle out at a much faster rate. The flocculation process may occur either through the chemical formation of a flocculent precipitate (such as ferric or aluminum hydroxide) which mechanically enmeshes suspended solid particles, or by ionization of the chemical coagulant into high-valence ions which neutralize the electrical charge on the colloidal particles, thus breaking down the repulsive forces between the particles. Ferric and aluminum salts, with or without lime, are the principal coagulents employed. These substances act in both of the ways described above. Flocculation is ordinarily accomplished in a flocculating tank by slowly stirring the mixture, after the chemicals have been added and mixed in a mixing tank. Sedimentation tanks are then employed to permit the settling of the flocs. Removal as high as 90% of the suspended solids and 80% of the B.O.D. may be accomplished by this process.[20]

Chemical and physical reaction: In this category fall aeration, precipitation, and neutralization. While these processes have applications in the treatment of industrial wastes, they are also commonly used in the purification of water.

The process of aeration implies increasing the concentration of dissolved oxygen in the water. This may be done in the stream itself or, more commonly, in the effluent before it is discharged. The aeration process is generally performed by means of spray nozzles or by bubbling the air through the water. Mixing of the water also aids, by reducing the length of the path of diffusion of air from the surface. In aeration processes, undesirable gases and odors are removed, in addition to oxygen being added. Aeration is extensively practiced in municipal water purification and in industrial waste treatment.

Chemical precipitation, as distinguished from coagulation, involves the actual reaction of an added reagent with substances dissolved in the water, with the formation of a precipitate. It is employed in water softening and in pH adjustment.

Adjustment of the pH does not necessarily imply the formation of an insoluble compound, as in the neutralization of waste pickle liquors or other acids with an alkali.

Disinfection: In this process, pathogenic bacteria are destroyed. It should be noted that bacteria are removed to a considerable extent along with suspended solids in sedimentation and coagulation processes. The methods of disinfection actually kill the bacteria. These methods are of great importance in the case of municipal sewage, but are also important in industrial waste treatment.[21]

The principal method of disinfection is by chlorination. This may be accomplished by bubbling chlorine gas through the water, by adding an aqueous solution of chlorine, or in the form of calcium or sodium hypochlorite.

Chlorination accomplishes other effects besides disinfection, since chlorine is an oxidizing agent. Substances having offensive odors, such as hydrogen sulfide, are destroyed by reaction with chlorine, and the B.O.D. is also reduced considerably. Part of the reduction in B.O.D. is only an "apparent" reduction in oxygen demand, since the bacteria which aid in the biochemical reaction have largely been destroyed by the chlorine, so that the reaction is retarded beyond that normal for the amount of organic matter present.[22] A term commonly used in chlorination practice is the "chlorine demand." It is measured in a manner similar to the B.O.D., except that the chlorine concentration rather than the oxygen concentration is measured.

Biological reaction: Complete treatment of a waste, including the removal of suspended, colloidal, and dissolved matter, requires the use of biological reactions. These methods are applied following preliminary mechanical, hydraulic, and disinfection treatments.

In general, there are two ways of carrying out the biological reactions. In one process, the waste is passed through a stationary bed containing the essential biological organisms; this is called "biological filtration." In the other process, the biological organisms are mixed with the waste; this is called the "activated sludge process."

Biological filtration is conducted by passing the waste through a porous bed of sand or stone, in the interstices of which a thin film of biological growth has been permitted to accumulate. The process is essentially the same as occurs in the soil and in streams, but the reaction is much more intense. The bulk of the oxidized material leaves with the effluent from the filter, which is never clear, and which must therefore be subjected to a sedimentation process. The principal type of biological filter now used is called the "trickling filter." It consists of a bed of coarse stone housed in a circular or rectangular tank, over which the waste is distributed. On the floor is an underdrain system which collects the liquid which trickles down through the bed. Adequate air circulation through the bed is obtained by connecting the underdrain system to air vents. The difference in temperature within and without the bed provides sufficient draft for the necessary air circulation.[23, 24]

When a waste is aerated for a sufficient time, the suspended and colloidal matter and the biological organisms form a floc. This floc may be recovered in the form of a thin sludge in an ordinary sedimentation process. If this "activated" sludge is then mixed with the raw waste, the biological reactions are accelerated. The process involves two principal parts: (1) aeration of the mixed waste and activated sludge, followed by (2) sedimentation. The sludge recovered in the sedimentation process is recycled to the aerator to be mixed with the raw waste. The effluent from the sedimentation unit is clear and may be discharged to a stream. Aeration may be accom-

(Continued on page 904)

What the Law Says

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FROM the point of view of the law there are many similarities between the problems of atmospheric pollution and stream pollution. But there are some significant differences, most of which arise due to the consideration of riparian rights in the question of stream pollution.

Legal liability for the pollution of streams may be predicated on any of three grounds; riparian rights, nuisance, and statutory prohibition. The first two of these are common law remedies while the latter takes the form of municipal, state and Federal stream pollution statutes currently in effect. But in each case of stream pollution several important questions must be asked and answered.

1. What are riparian rights?

The law of riparian rights is a part of the law of real property, and it is therefore necessarily of a strict, technical nature. Riparian rights are the rights possessed by owners of land adjoining streams to the use and enjoyment of the water in the streams. Since there are, in general, many "riparian" owners, it is obvious that no one owner will ordinarily have the exclusive right to the use of the water, for each riparian owner must have similar rights. The basic legal problem is the apportionment of these rights among the various riparian owners.

2. How are riparian rights apportioned?

Originally, the "natural rights" doctrine prevailed in riparian law. According to this doctrine, each riparian owner is entitled to have the stream continue to flow through or by his premises in its natural condition of purity, and undiminished in quantity.[2] Under this doctrine, any "perceptible" diminution in quantity or any "perceptible" contamination is a violation of the rights of all lower riparian owners. It is, in legal effect, a trespass, and is accordingly actionable. This doctrine does not prevent an upper riparian owner from taking water from the stream, providing he does not permanently remove such an amount as to decrease "perceptibly" the quantity of water flowing downstream, and providing he injects no "perceptible" amount of contaminants into the stream. As a practical matter, however, this doctrine is very harsh, particularly where industry or other large users of water are involved, since it gives virtually all rights to the lowest riparian owner at the expense of all upper owners.

3. What is the "reasonable user" doctrine?

The harshness of the natural rights doctrine has been mitigated in many states by the use of the "reasonable user" doctrine. According to the "reasonable user" doctrine, any riparian owner is entitled to make a use of the water which is reasonable in view of the needs of lower riparian owners. It is apparent that this is an extremely flexible doctrine, and one which will usually give very equitable results. The difficulty with this doctrine, however, is in its uncertainty. The uncertainty arises partly because of the difficulty of knowing what is "reasonable" in any given set of circumstances, and also because what is reasonable at one time may become unreasonable at a later time. The difficulty in defining the word "reasonable" is essentially the same as that encountered in the law of nuisance. This has been discussed in detail elsewhere.[1]

The uncertainty as to the rights possessed by a riparian owner when circumstances are altered is illustrated by the following example:—A lower owner sets up a new factory, which requires considerable water; this reduces the amount which may "reasonably" be used by the upper owner, despite the fact that he has invested large sums of money in reliance on his supposed water rights.—It may be added also that in some states, the "reasonableness" of use is interpreted more strictly against manufacturing and industrial uses than against farm or domestic uses. This is a vestige of the "natural rights" doctrine.

4. How is the older user protected against newcomers?

In order to obtain greater certainty, and yet obtain the maximum possible use of water resources, a few Western States which suffer from water shortages have developed a new doctrine which protects a prior user against the possibility of later users decreasing his water rights. This is the "prior appropriation" rule. The majority rule at present in the United States is the "reasonable user" doctrine, but the "natural rights" doctrine still exists in many states.

5. Do riparian rights pass along with the title to the land?

The legal nature of a riparian right is an "easement appurtenant." That is to say, it is a right which is legally annexed to the soil and which inheres in the (real) estate. It cannot be granted or conveyed to one who is not a riparian proprietor, since it is impossible to sever it from the riparian realty. It passes along with title to the realty. Thus, it is "appurtenant" to the realty. It is an "easement," since it is a right to prevent another owner of realty from exercising certain rights with respect to his land, i.e., it is a "right in the land of another."

As a result of this technical rule, it follows that non-riparian owners cannot have any riparian rights. The fact that one is permitted by a riparian owner to use water from the streams does not give the former any riparian rights. (It does, however, give him a contractual right, which is good only against the party with whom he contracted.) In this respect, a riparian "owner," or "proprietor," is not necessarily the title-holder, but also includes one who is in rightful possession as a tenant.

6. How does the amount of land owned affect riparian rights?

By definition, a riparian owner is one who owns any amount of land adjoining a stream—no matter how small the amount of land adjoining the stream may be. And the quantum of the rights of a riparian owner is not measured by the amount of his land which borders the stream—but rather by the *entire* extent of his contiguous land. Thus, a very small strip of land adjoining a stream may give rise to riparian rights in a very large amount of contiguous land. The problem of what happens if a portion of the land not adjoining the stream is sold separately from the portion adjoining the stream is complicated. In most states, the riparian rights do not remain in the land which is no longer "riparian," other states hold that once any land is "riparian," it remains so, no matter what happens to it.

7. What is the situation regarding pollution?

As a general rule, it is no excuse or justification to a defendant that others are also contaminating the stream, or that the stream was not entirely pure when it reached defendant's property. Nor is it a defense that the pollution was the natural and necessary result of the particular mining

or industrial operation, nor that the operations were conducted without negligence and in accordance with the general custom and practice in the vicinity or in the particular industry. The existence or non-existence of negligence is irrelevant, so long as the injury has occurred.

Equitable defenses, such as laches, "clean hands," etc.,[1] are not applicable in determining the existence of an interference with riparian rights, since the action is based on law, and not equity. Thus, it is no excuse that the complaining party did not object to the opening of a mine or the building of a plant. Nor is there any public policy in favor of industrial development, which would justify for the sake of a factory or mine the destruction of the rights of riparian owners. Thus, there is no "balancing of conveniences" in determining whether a violation of riparian rights exists.

8. What remedies are there against the threatened or continued pollution of a stream?

Aside from the usual remedy of damages for interference with riparian rights, it is often possible to obtain, in a court of equity, an injunction against a threatened or a continued pollution of a stream. The obtaining of an injunction is based on the same equitable principles that often apply to atmospheric pollution. Thus, the fact that an injury exists is not in itself sufficient to provide grounds for an injunction. It must be shown that irrepairable injury will result (i.e., that money damages are inadequate), and that there is no other adequate remedy at law.

The same conclusions as to the "balance of convenience" doctrine as were reached with regard to atmospheric pollution[1] apply also to stream pollution. That is to say, in slightly more than half the states, the importance and value of the business to the community, and the fact that an injunction will cause more damage to the defendant than benefit to the plaintiff, are not sufficient grounds for refusing an injunction. The existence of a statutory remedy of abatement does not exclude the possibility of obtaining an injunction. Not only may private persons and corporations be liable for stream pollution, but so also may public utilities, municipalities, and even the state. (However, a state cannot be sued without its consent.)

9. How may the right to pollute a stream be secured?

The right to pollute waters may be purchased from a riparian owner, but it is binding only on him and on his land. It is a covenant which affixes to the land of the lower riparian owner, and it cannot be separated from this property. It is an easement appurtenant, just like the right to prevent pollution. However, this right extends only to the land of the riparian owner who has consented to permit pollution of the stream; it does not extend to other riparian owners who have not made similar agreements. The fact that some riparian owners have made such agreements does not prevent another riparian owner from insisting on his right to an uncontaminated stream. If the pollution is a menace to health, or a public nuisance, the agreement is void as against public policy.

The right to pollute a stream can also be obtained by prescription, as well as by purchase. This will occur if, but only if, each of the following requirements have been met: the pollution must have been injurious to the lower riparian owner in question, it must have been adverse (i.e., without the consent of the lower owner), it must have been under a claim of right on the part of the upper owner, it must have been an open and notorious act on the part of the upper owner (i.e., not secret), and it must have been uninterrupted for the full period of the statute of limitations.

The statute of limitations begins to run at the time the pollution becomes injurious to the plaintiff, in states which follow the reasonable user doctrine. In those states which follow the natural rights doctrine, the statute of limitations begins to run as soon as the pollution begins, even if it has not yet become actually injurious to the plaintiff in a pecuniary sense. A prescriptive right will, however, not arise if the pollution constitutes a public nuisance. In a few states, the right to pollute can never be acquired by prescription.

10. What is the liability under the nuisance doctrine?

Nonriparian owners have no riparian rights, and they can sue only if the pollution constitutes a nuisance, i.e., if it interferes with the use and enjoyment of their real property. For example, if the pollution causes the breeding of mosquitoes, a nuisance may exist as to nonriparian owners. Private nuisance is, however, a relatively rare basis of liability for stream pollution. The principles of nuisance, concerning atmospheric pollution,[1] are also applicable here, including the principles of public nuisance.

11. Why is the statutory regulation of pollution necessary?

As in the case of atmospheric pollution, the common law remedies have been found incapable of preventing general stream pollution. Consequently, stream pollution ordinances and statutes have come into effect. A recent survey of stream pollution statutes in the United States and in Canada[3] indicates that practically all jurisdictions have anti-pollution statutes with "teeth" in them. The trend has been accelerating in the past ten years.

The statutes vary considerably. Most statutes are administered by state health agencies. Most statutes do not specify definite types of waste which must be treated, nor do they require pretreatment of all wastes before discharge into streams. Most of the statutes require presentation to the board and approval of plans for waste treatment. Penalties are generally fines and imprisonment; often each day of continued pollution is considered a separate violation. The Board can also seek an injunction, in order to abate the pollution.

Stream pollution statutes are based on the police power of the state. It is therefore not generally necessary to prove the existence of a public nuisance, so long as pollution is shown. In some parts of the countries, interstate compacts have been made between several states for a single watershed.[5]

12. What is the scope of the Federal stream pollution statute?

A Federal stream pollution statute was passed in 1948 (Public Law 845—the Water Pollution Act of 1948). This act is administered by the Public Health Service. It does not, however, directly assess liability for pollution of streams, but provides monetary aid for state enforcement agencies, and loans to industries and municipalities for the construction of pollution control plants.[4] The Federal government has no police power; the statute is accordingly based on the power of Congress to regulate interstate commerce. This power extends only to navigable streams, but it is an extremely strong power, which may be further exercised in the future, if necessary.

As in the case of atmospheric pollution, it should be pointed out that the existence of a statutory remedy in no way infringes the common law remedies for stream pollution. Thus, the statutes do not take the place of the common law of stream pollution, but instead supplement it.

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Know the Law!

by LEO T. PARKER, Attorney at Law
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Judicial decisions now make top reading among chemical executives. A prominent attorney reviews some recent decisions that will affect chemical industry and business.

DURING this year the higher courts of the nation have handed down many interesting and outstanding decisions involving chemical manufacturers and distributors and those who buy and sell chemical products. Damage liability, taxes, patents and purchasing agreements were only a few of the topics covered in the range of these decisions. Indeed, to be effective, modern management must now keep itself as aware of precedent making court decisions as it does of pace setting commodity trends.

Re: Protection of Trespassers—A few weeks ago a reader asked the writer these legal questions: "What must the owner of a chemical plant do to avoid damage liability if a child is drowned in water which accumulated on the premises. Does the law require the owner of the property to erect a fence around ponds, and other dangerous locations"

According to a recent higher court the answer to these questions is: If an adult is drowned while trespassing on private property there is no liability. As to children the owner of the premises should use "reasonable care" to prevent trespassing children from playing on the property or swimming in a pond. However, the law does *not* require the owner of the property to erect a fence to keep children from trespassing on the property.

For illustration, in Graves v. Dachille Co., *43 N. W. (2d) 64*, the testimony showed facts, as follows: The Dachille Company dug a hole or sump in the low portion of its property and as drainage water collected in this sump it was pumped through a hose into the public sewer. The sump pump got out of order and a considerable quantity of water collected in the hole or sump.

One day a boy, six years old, took off his clothes, and went into the water. He was drowned. His parents sued the Dachille Co. for damages and proved that it had permitted water to accumulate in the sump, and that this water was stagnant and the surface covered with oily scum. Also, the property was unenclosed. The parents alleged that the company's officials were negligent because they allowed stagnant water to accumulate and remain in the sump, knowing that children frequented the premises; and that they failed to erect fences or to provide effective guards to keep children away from the pond or sump, especially since it was known to the officials that these premises were frequented by both adults and children.

Nevertheless the higher court refused to hold the Dachille Co. liable in damages for death of the boy, saying:

"The rigging of a hole or sump in which to collect drainage water was a necessary incident to the business, and allowing water to accumulate in the sump on defendant's property was within their legal right. Defendants were not obligated to fence their premises in an effort to prevent trespassers from entering and going into the excavation thereon where water had collected."

Re: Occupation Tax—Modern higher courts consistently hold that tax laws are construed strictly in favor of the taxpayer and against the state, county or city which enacted the tax law.

For example, in Philtex Chemical Co. v. Sheppard, *219 S. W. (2d) 1010*, it was shown that a state statute imposes an occupation tax on the production of carbon black, and defines "carbon black" as all black pigment produced in whole or in part natural gas, casing-head gas, or residue gas.

The Philtex Chemical Co. produces carbon black, but not from gas.

The higher court decided that the Philtex Chemical Company need not pay tax to the state, and said:

"Courts must take statutes as they find them. They are not the law-making body. They are not responsible for omissions in legislation. . . . Tax statutes are construed strictly in favor of the taxpayer and against the state."

Re: Employees and Patent Ownership—Another important legal question is: When does an employee own a patent on an invention he patented?

According to a recent higher court where an employee is employed to devise, perfect or invent he cannot, after successfully accomplishing the work for which he was employed, file an application for a patent in his own name. In other words, whatever rights as an individual he may have had in his inventive powers he has sold in advance to his employer, who paid for his time, work and effort.

For example, in Marcalus Manufacturing Co. Inc. v. Sullivan, *60 Atl. (2d) 330*, the testimony showed that a manufacturer employed a regular chemist but he was busy with the general chemical problems of the company, and it was decided that an outside chemist should be hired who could devote his time to the discovery and development of a new process. The president of the chemical manufacturer contacted a chemist named Sullivan and explained what he desired. Sullivan worked regularly for a large food concern. It was agreed that Sullivan should receive $5.00 an hour for the time spent upon the manufacturer's problems. Sullivan started to work for the manufacturer and continued working at his own home night times upon the problem for 11 months. He rendered reports of his progress from time to time and submitted samples of the product.

Sullivan did not report for some time and the manufacturer testified that he called Sullivan to inquire about the progress being made. Sullivan informed Marcalus that he had perfected a formula which, he felt, accomplished the desired results but that he had invented it on his own time. Later Sullivan arranged to go to the plant with a sample of the product produced. The manufacturer, upon being shown the sample, agreed with Sullivan that it met the specifications. When the manufacturer asked for the formula, Sullivan said that it was so good he wished to take steps himself to

protect it. Later Sullivan explained to the manufacturer that he had perfected the invention but not during the time he was paid $5.00 an hour. Sullivan maintained that he had perfected the process on his own time.

Notwithstanding this testimony the higher court ordered Sullivan to assign the invention to the manufacturer and said:

"Sullivan attempted to justify his refusal to turn over the formula by stating that it was discovered when he was not working for Marcalus (manufacturer). . . . Sullivan also testified that the final formula was in no way related to the research he had been doing throughout the year. He insisted that his work for Marcalus had been of no value to him in reaching the ultimate result. . . . Sullivan's testimony is *not* convincing."

Hence, in this case the higher court decided that the chemical manufacturer owned the patented process because Sullivan perfected it while being paid by the manufacturer. Quite obviously the decision would have been otherwise if the court had decided that Sullivan perfected the patented process on his own time while not being paid by the chemical manufacturer.

To avoid similar litigations employers may include in contracts of employment a clause to the effect that the employee will assign to the employer all inventions and patents conceived, devised and obtained during the full period of the employment.

Re: Patents on Scientific Fact—Modern higher courts consistently hold that a valid patent cannot be obtained on an invention comprising scientific data, or facts.

For illustration, in Davison Chemical Corp. v. Joliet Chemicals, Inc., *179 Fed. (2d) 793*, the testimony showed facts, as follows: Silica gel is a hard, transparent substance with ultra-microscopic pores, possessing ability to absorb moisture from the air, making it useful as a desiccant. It has other commercial uses where adsorptive purposes are desired and where catalysts are useful, as in oil refining. Some commercial uses necessitate very small pores in the physical structure while for certain others, larger pores are desirable. All this was common knowledge when one Connolly applied for a patent. The industry was then manufacturing silica gel by mixing sodium silicate with an acid under violent agitation, allowing the resulting product to set, breaking it into small pieces, washing it free from acid and salt and drying it at a fixed temperature. Connolly discovered for the first time that a definite relationship exists between the temperature of the wash water and the porosity of the final product. He found that the higher the temperature, the lower the density.

The higher court held the patent invalid as involving merely a scientific fact. The court said:

"It is one thing of course to discover a scientific fact, a law existing in nature, and quite another to invent a means of making that discovery useful. . . . He who discovers a hitherto unknown scientific fact or law of nature has no claim to a monopoly of it. . . . To find the range, required nothing more than routine experimentation by a skilled chemist, and that being so, invention was not involved."

For comparison, see the late case Application of Norris, *179 Fed. (2d) 970*. This higher court held that a chemical combination valuable as an intermediate for the production of keto nitriles and esters by hydrolysis, amino acids, diamines and other products, was *not* patentable despite newness and usefulness where the testimony showed that it was isomeric with well known compounds and did not have unexpected characteristics or properties.

Re: Income Tax Overpayment—According to a recent higher court if a taxpayer through mistake pays more income tax than he owes, he cannot recover the overpayment from the government unless he files a claim within three years, but the government has four years to sue and collect any under payment from a taxpayer.

For example, in Hono Company v. Kanne, *76 F. Supp. 790*, the higher court refused to allow the Hono Company any credit for overpayment of its United States income taxes because the company delayed mode than three years after it filed its return to file a claim with Collector of Internal Revenue for the overpayment.

The higher court held valid a United States statute which provides that unless a claim for credit or refund of income taxes is filed by the taxpayer within three years from the time the return was filed by the taxpayer, or within two years from the time the tax was paid, no credit or refund shall be allowed.

For comparison, see Kavanagh v. Noble, *332 U. S. 535*. Here the U. S. Supreme Court held that although a taxpayer cannot recover any overpayment of income taxes unless the claim is filed within three years after the taxpayer filed his tax return, the government has four years in which to sue a taxpayer for money overdue.

Re: Contracts to Purchase—Considerable discussion has arisen from time to time over the legal question: If a purchaser signs a sale order or contract containing a clause that he cannot cancel the contract can the purchaser avoid paying the contract price for the merchandise? According to a recent higher court the answer is no.

For illustration, in Dixie Pine Products Co. v. Universal Refining Products Co., *43 So. (2d) 752*, the Dixie Pine Products Co. sued the Universal Refining Products Co. for the contract price of a shipment of a chemical cleansing compound for steam boilers known by the trade-name of Scalenemy. The purchaser alleged that cleansing compound for steam boilers known by the trade-name of Scalenemy was unsatisfactory. The testimony showed these facts: The shipment was made pursuant to a written order signed by the purchaser and also signed by the seller's salesman. This order gave an accurate description of the goods purchased, the price thereof, and the terms of sale. The order stipulated that all special terms or agreements between the buyer and seller should be incorporated on the order and further the order was not subject to countermand. The goods were shipped pursuant to the terms of the order.

The jury held that the purchaser must pay the contract price to the seller. The higher court affirmed the verdict and said:

"Prior to the order here sued upon appellant (purchaser) had bought several orders of the same commodity aggregating about 5,000 pounds, and after using the product for several months placed the order now in question."

Re: Payment of Freight Charges—According to a recent higher court a railway company or trucking company can collect legal freight charges irrespective of errors, promises or contracts for lower freight rates. This is so because an obligation to pay transportation charges is not merely a private one, but the duty to pay is a public one.

For example, in Atlantic Coast Line R. Co. v. Wannamaker Chemical Co., Inc., *57 S. E. (2d) 311*, it was shown that a tank car was consigned to the Wannamaker Chemical Co. At this time an official of the chemical company asked an authorized agent of the carrier what freight charges were due. The carrier's agent incorrectly told the official that all freight charges had been paid. Later the carrier sued the chemical company for $212.99 freight charges. The chemical company's counsel argued that the company could not be liable for payment of the freight charges. Nevertheless the higher court

held that the chemical company must pay the full freight charges, and said:

"It is well settled that where error or misrepresentation is made by the carrier as to the tariff rate or the amount owing for transportation, there can be no estoppel if it subsequently develops that the proper amount was not collected. So that, if the carrier charges and receives only a part of the lawful tariff on a shipment, and the shipper or consignee pays the same in good faith, relying upon the statement of the carrier that the payment is in full, the carrier is not thereby estopped from collecting the full amount from any party legally liable therefor. . . . The federal law makes the consignee accepting a shipment liable for the tariff charges."

The decision in the case, Western & Atlantic et al. v. Underwood, *281 F. 891,* also bears upon this point. The higher court held that although a common carrier signs a written contract to transport merchandise at rates less than fixed by tariffs, yet the carrier may sue the shipper and collect the full tariff rates, notwithstanding the fact the carrier has been transporting merchandise at the lower rates for several years.

Re: Responsibilities of Skilled Trades—Modern higher courts consistently hold that if a manufacturer or other person holds himself out to the world as skilled in any art, trade or profession and have people put themselves or their belongings in his charge, such manufacturer or person is responsible for injuries he causes innocent persons or customers. However, where *no negligence is proved, there can be no liability.*

For illustration, in Bush v. Bookter, *47 So. (2d) 77,* it was shown that one Bush suffered damages from use of a chemical rinse and dye remover. The higher court held Bush not entitled to damages.

Re: Deceit and Fraud—Considerable discussion has arisen from time to time over the legal question: When is a seller of chemicals liable to a purchaser for deceit or fraud?

According to a recent higher court to successfully maintain a suit for deceit, the buyer must convince a jury (1) that the seller made some false representation to the purchaser believing that he should act upon it; (2) that such representation was false and the seller knew it to be false; and (3) that the purchaser believing such representation to be true, acted upon it and was thereby damaged.

If either of these elements is *not* proven the seller is not liable to the purchaser. On the other hand, if the purchaser convinces a jury that all elements were present he *can* recover damages from the seller.

For example, in Fischetto, Inc. v. Quig Company, Inc., *69 Atl. (2d) 318,* a purchaser filed a suit against a seller alleging that the former had purchased and paid for different shipments of merchandise for a long time, and during this period was defrauded by the seller because the weights of the shipments were overstated, resulting in payments over and above the reasonable value of the merchandise received to the extent of approximately $15,000. The jury believed the testimony presented by the purchaser and rendered a verdict in favor of the purchaser. The court said:

"The intent to defraud, we think, was amply proved and there was direct testimony as to the reliance upon the representations made. . . . Where fair minded men might honestly differ as to the conclusions to be drawn from the proofs, the questions at issue should be submitted to the jury."

Re: Damages from Dangerous Chemicals—Considerable discussion has arisen from time to time over the legal question: Is a seller of dangerous acids, chemicals, etc. liable in damages for injuries to a purchaser caused by breakage of a container?

According to a recent higher court the answer is no.

For example, in Mabee v. Sutliff & Case Chemical Co., Inc., *88 N. E. (2d) 12,* it was shown that the Sutliff and Case Chemical Co. sold and delivered to one Mabee two gallons of sulphuric acid in glass jugs. While Mabee was carrying the jugs one of the jugs for some reason broke and spilled acid on his body. At this time the glass jugs containing the acid were under the exclusive control and management of Mabee. Mabee sued the Sutliff and Case Chemical Co. for heavy damages contending that his injuries resulted from negligence of the Sutliff and Case Chemical Co. in supplying a defective and dangerous glass jug. However, Mabee failed to prove that the glass jug was defective. The higher court refused to hold the Sutliff and Case Chemical Co. liable, and said:

"There was testimony tending to show that the sulphuric acid was dispensed and delivered in glass containers in accordance with the accepted and standard practice for handling such acid; that the glass containers had been inspected prior to being filled with the acid and that neither the temperature nor the method of transporting the acid would cause the containers to break or the acid to explode when taken into a warm room."

Re: Sales "Advances"—Considerable discussion has arisen from time to time over the legal question: If a salesman who sells chemicals on a commission basis receives weekly advances from his employer, must the salesman repay to his employer money "advanced" to the salesman over and above the amount of his earned commissions?

According to a recent higher court the answer is no. This is so because various higher courts have held that where a contract of employment provides for advance payments to the employee, which are to be charged to and deducted from the commissions to be paid to the employee, the employer cannot recover from the employee such excesses or advances unless the employer *proves* that the employee agreed to repay the amount of money advanced over and above the commissions earned by the employee.

For example, in Harold Co. v. Junglas, *88 N. E. (2d) 586,* the testimony showed that a salesman named Junglas made a written contract with the Harold Co. to sell its products. This written contract provided that the company would pay to Junglas a weekly "advance" or "draw" of $36.00. This was later increased to $40.00, plus an agreed commission on all sales. The advanced weekly salary was to be deducted from earned commission payments. The company "advanced" the salesman several hundred dollars, but his commissions were only $35.35. Junglas refused to pay the difference between the advanced money and $35.35 earned commissions to the company which sued Junglas to recover this amount, plus interest.

The higher court held that Junglas need not repay the company and said: "The record is totally lacking in evidence of any promise or agreement by Junglas that he was to be obligated to repay any amount of advances over earned commissions. The record is devoid of any evidence of conduct from which such an obligation could be implied."

Also, see Anagnosti v. Almy, *252 Mass. 492.* Here the contract provided that the salesman was "to have a drawing account of one hundred dollars per week, which shall be charged against his portion of said net profits." But the salesman drew fifteen hundred dollars more than his earned commissions.

In subsequent litigation the higher court held that the salesman need not repay this amount to his employer. This court held: "Advances by employer in excess of commissions earned by employee are not recoverable by employer, in absence of agreement to that effect, expressed or implied."

CHEMICAL SPECIALTIES

Alkalies for Bottle Washing

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BOTTLE WASHING COMPOUNDS—a 38,000-ton annual market for alkalies—are composed chiefly of caustic soda, but employ synthetic detergents and other chemicals, reflect technological advances.

THE past fifty years have seen a marked change in marketing of consumer goods. During this era there has been a gradual but almost complete transition from the use of bulk containers to the use of individual small unit packages. Nowhere has it been more complete or more dramatic than in the distribution of food products such as milk, beer, butter, crackers, coffee, and soft drinks. All of these and many others now come to us direct from the producer in neatly packaged units of one pound, one quart or less. The cracker barrel is indeed a symbol of a bygone era.

This basic change in food distribution has produced corresponding changes in other related industries, specifically in the production of bottles and bottle washing equipment and in the consumption of chemicals used for bottle washing. For example, production of all bottles rose from 7¾ million gross in 1899 to an all time high of 115 million in 1946 (Figure 1). As the total numbered increased each year so did the requirements for bottle washing. Consequently the manufacture of bottle washing machines which did not rate a place in the early statistics has reached an impressive value of over $20 million in recent years.

In the case of alkali it is estimated that consumption of those products used exclusively for bottle washing was 4000 net tons in 1889. By 1949, the annual consumption of alkalies for this use reached an estimated total of 38,000 net tons (Figure 2). It is obvious that from a very feeble start this market has grown to a place of considerable prominence as a consumer of alkali products and therefore receives the best technical and research efforts that the alkali industry can give.

In this effort to provide satisfactory results the industry has found it essential to design bottle washing alkalies for certain specific conditions. These conditions are imposed by the type of bottle, its use by the consumer, and the type of equipment in which it is worked. It is convenient to classify these into three main groups: (1) milk (2) beer (3) carbonated beverages. Many of the problems encountered in bottle washing are common to all three groups but the differences in washing procedure are sufficiently great to warrant the separate categories. Dairy, brewery, and carbonated beverage plants all employ alkali products to wash bottles returned from customers prior to refilling. The operator requires the washed bottles to be spotlessly clean, "commercially" sterile (low bacteria count), and free of water spots.

BOTTLE WASHING MACHINES

The majority of bottlers have mechanical bottle washing machines in which the washing is performed. These machines are of three types: hydro, soaker, and combination hydro-soaker. A hydro washer consists of a series of spray jets which first force alkali and then rinse water over the inside and outside surfaces of the bottles. The soaker machine contains from one to six large tanks in which the bottles are immersed or "soaked" in alkali solution. Subsequently, the bottles are sprayed with water to remove the residual alkali. Combination hydro-soaker washers have both tanks and spray jets for washing the bottles with alkali solution.

COMPOSITION OF ALKALI COMPOUNDS

The primary ingredient of all machine bottle washing compounds is caustic soda. It is this ingredient which provides the greater part of the cleansing and sterilizing, as well as the lubrication of the moving parts immersed in the solution. However, caustic soda is not used alone to any great extent because it is not easily rinsed from the bottles, and it has a tendency to form heavy scale on the washer when used in relatively hard water. Consequently, other alkalies are combined with the caustic soda to provide the proper rinsing properties and lessen scale formation. In some waters, other alkalies are required to insure complete softening, and it is impossible to produce bright, sparkling bottles without completely softening the water.

BOTTLE WASHING, boosted by the swing to individual small unit packages.

The composition of some bottle washing alkalies is given in Table I. It will be seen that they contain soda ash, trisodium phosphate, sodium metasilicate, tetrasodium pyrophosphate, and organic wetting agent in combination with the caustic soda. Each of these non-caustic alkalies has the property of improving the rinsability of the compound, and each insures complete water softening. However, the phosphates rinse most freely, lessen the quantity of scale deposited on the washer, and do not interfere with the lubrication of the washer. Their only disadvantage is that they have a tendency to cause foaming in certain types of washers.

Sodium metasilicate is slightly inferior to trisodium phosphate in rinsability and descaling properties. It lessens foaming but it interferes with the

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lubrication of the moving parts. Because of this fact it is not widely used in bottle washing compounds.

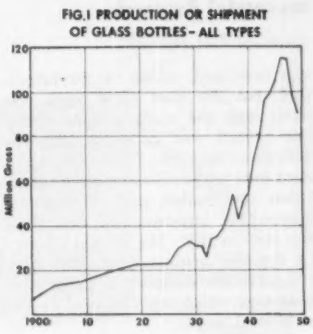
The use of soda ash-caustic soda combination for bottle washing insures complete water-softening, proper rinsing, and good lubrication. However, scale formation may be relatively heavy in hard water districts, since soda ash lacks the scale softening properties of trisodium phosphate and sodium metasilicate.

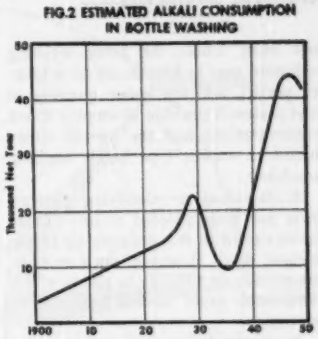
A bottle washing compound generally contains at least 50% caustic soda, and the balance is composed of some of the above mentioned non-caustic alkalies. The Association of the American Bottlers of Carbonated Beverages approves products having at least 60% caustic soda. Generally, the products having less than 70% caustic soda are employed in hydro washers, while soaker machines use products having higher caustic content.

The better the rinsing properties of the non-caustic alkali content, the higher may be the percentage of caustic soda that can be included and still insure complete rinsability of the product. As a result, a product containing 5% anhydrous trisodium phosphate and 95% caustic soda will rinse as freely as one having 30% soda ash combined with 70% caustic soda, and the user has the advantage of 25% more of the active cleansing and sterilizing ingredient.

One of the most important factors in good cleaning and sterilizing of bottles is the maintenance of as high a solution temperature as is possible without excessive breakage of bottles. Generally, the temperature of the first and last solutions are held between 90° and 120° F. The intermediate solutions are hotter, with a maximum of 170° F., and a range between adjacent tanks of no more than 40° F. A greater range causes excessive breakage.

The scale deposit mentioned previously is a formation of insoluble salts which is caused by the reaction between the bottle washing alkali and the hardness salts in the water. The insoluble material attaches itself to the moving parts of the washer, and becomes excessive weight which must be moved during the bottle washing operation. Consequently, operators desire to lessen or prevent such deposit. Trisodium phosphate and sodium metasilicate decrease scale formation to a greater degree than caustic and soda ash, because they react with water hardness salts to form a light, flocculent compound a portion of which is rinsed away before it can attach itself to the metal.





MILK BOTTLES

Milk bottles are considered relatively easy to clean, the soils principally being dried milk and chocolate. Consequently, all types of bottle washing machines are used in dairies. The concentration of alkali may be as low as 0.5%—if state or local ordinances do not require higher concentrations.

It is unusual to employ concentrations over 3% and temperatures over 150° F. in washing milk bottles. When bottles with colored lettering are being washed the concentrations and temperatures should be as low as possible to produce clean, sterile bottles. Enameled letters are not as resistant to alkali as is glass, and there may be some fading of the colors if the bottles are subjected to repeated soakings in hot alkali solutions at concentrations of 3% or higher.

BREWERIES

The major portion of the alkali required in the brewing industry is used for bottle washing. The quantity of bottle washing alkali used in a brewery is considerably greater than that employed in a dairy or carbonated beverage plant of similar capacity. This is due to the fact that (1) the principal soil is a relatively resistant acidic dirt, (2) returned bottles are dirtier than those encountered in other bottle washing plants and (3) bottle labels accumulate in the washer. These factors necessitate frequent replacement of the bottle washing solution. As a result most breweries employ soaker type bottle washing machines.

In order to conserve from ⅛ to ½ of the bottle washing alkali, many breweries have installed a reclamation or clarifying system. The label-filled alkali solutions are run from the soaker compartments through a coarse screen into a large settling tank. After several hours the major portion of the labels and heavy dirt not removed on the screen, are precipitated to the bottom, and the relatively clear solution on top is ready to be returned to the soaker. After testing, makeup is added, and the solutions are again ready for washing bottles.

CARBONATED BEVERAGES

As in the brewery, a large portion of the alkali used in carbonated beverage plants is used for bottle washing. However, many carbonated beverage plants do not employ paper labels on the bottles, and the returned bottles are generally cleaner than those received in breweries. As a result, in the plants

TABLE I—COMPOSITION OF TYPICAL BOTTLE WASHING COMPOUNDS*

	NaOH %	*Sod. Meta.* %	*TSP* %	*TSPP* %	*Tri Poly* %	*Soda Ash* %	*Syn. Deterg.* %	*Other* %	*H_2O* %
DAIRIES									
1	92		6			2			1
2	88	3	4			3			2
3	87		9			1			3
4	70				20	9	1		
5	90	5	2			1			2
6	91		5			2		2	
7	59	4	13			18	1		5
8	100								
9	92	6				2			
10	90				9		1		
11	88			10			2		
12	70			24			6		
13	88		5			2			5
14	88		8			2			2
15	95		4			1			
16	90			7		2			1
17	83					14			3
BREWERIES									
Same									
CARBONATED BEVERAGES									
Same except omit 8									

* *Product Development Department, The Solvay Process Division.*

not using labels, the bottle washing solutions may be kept in use for a longer period, and the lesser quantity of dirt makes it possible to employ lower concentrations and the use of either hydro or soaker type bottle washing machines.

Reclamation or clarifying systems have not been adopted to any appreciable extent in this industry up to the present date. However, such systems are equally as valuable to plants which must wash paper labeled bottles as to breweries.

Aluminum foil is used rather extensively for decorating beverage bottles. This material reacts with the caustic soda content of the bottle washing alkali to form sodium aluminate. The method of titrating sodium hydroxide in the presence of the aluminate that is described in U. S. P. 2,332,497 is widely used here for titration of the bottle washing alkali.

RECENT DEVELOPMENTS

During recent years there have been numerous technological advances in bottle washing. For example, the beryllium, zinc and aluminum compounds were introduced as a means of substantially reducing the corrosive action of alkali on glass. Those synthetic detergents which are stable and soluble in caustic solutions — alkyl aryl sulfonates, for example—have become increasingly important in the bottle washing field through their contribution of speedy wetting and free rinsing properties. Nytron, one of the newer synthetic detergents has shown the unique combination of corrosion inhibition along with these other advantages of the synthetic detergents. Some of the newer anti-foaming agents such as Dow Corning Silicone A are making possible the use of mixtures which would have been unacceptable a few years ago because of foaming.

Many of the problems of bottle washing have been solved, but not all of them. The ideal bottle washing alkali must be inexpensive, fast acting, free rinsing, non-foaming, non-corrosive, non-scaling, and bacteriacidal. Such a material will produce brighter, cleaner, more sterile bottles with less breakage in machines operating at higher speeds. Such technical advances are necessary if the glass bottle is to retain its place in competition with paper containers for milk and frozen concentrates, cans, single-trip glass containers, plastic bottles and other worthy competitors in the packaging field. This "ideal" cleaner has yet to be produced, but the industry is alert to the many new developments that are going on and is quick to incorporate them into products.

Successful Research

(Continued from page 892)

idea developed rapidly in the laboratory, but the pilot plant work was fairly long and costly because rather fine control was necessary and was difficult to work out. Part of the equipment used in the old commercial installation was usable, and as a consequence, the investment in new plant was not too high. The savings effected by the new process were quite high and gave the company a competitive advantage which could be used in any of several ways.

Table VI shows the return produced by a new process for an established small-volume chemical. In this case the old chemical method of manufacturing the product was replaced by a catalytic method which, incidentally, will probably be licensed to other manufacturers. It is interesting to note that more money was spent on laboratory work than on pilot-plant studies. Because the product was an old one, no market development was required. The company's estimate of the life of the product as "permanent" may appear optimistic, but the interpretation is apparent: The product has been around for a long time and will continue to be needed. Unfortunately the "savings" figure was not given, but it is understood that the increased profits were gratifying.

Going to another category, table VII summarizes the history of an improved process for refining a petroleum product. This project was on the books for a long period of time, but the total outlay for laboratory and pilot plant work was spent during the first few years of the project. Market development was placed in the hands of a licensing agent, and the company finally installed the process in its own plant. The plant cost was fairly high, but the process immediately gave a saving of $120,000 per year in comparison with the unimproved process. Note also that this process was licensed to other companies and provided additional revenue which is not included in the bottom figure.

The final table (VIII) shows the savings resulting from working out in the laboratory and pilot plant an idea suggested by a chemist who had heard a discussion of some plant problems. The idea was so obvious that several short-cuts were possible, and within seven months the preliminary work was finished and the necessary small modification of the existing plant was completed. As is evident, the savings are very substantial. The estimated life of the "advantage" seems conservative, since the chemical involved is an old one, the old process had been in use for 20 years, and the improvement had been missed for all that time.

In summary, it is worth repeating that research and development requires a large and continuing expenditure for manpower and materials, and enough time to work on its projects. The chemical industry as a whole spends about 2.6% of gross sales on research and development, and pays out from $9,000 to $30,000, depending on the company, for each professional technical man on its research payroll. Moreover, industry has recognized the importance of providing good tools and working space for research, and has been willing to spend very large amounts for buildings.

Nor is it a short-term affair: Several years are required for an important development to begin to pay off. The average is about seven years.

Nevertheless, the down-to-earth figures prove that successful research projects materialize into valuable investments, and they produce an attractive return over a satisfactorily long period of time.

Based on a paper presented at the Pacific Northwest Research Conference at Portland, Ore., September 18, 1950.

Stream Pollution

(Continued from page 898)

plished in a tank equipped with air inlets at the bottom. Alternatively, it may be accomplished by means of a mechanical agitator equipped with an updraft or a downdraft tube, which either causes the waste to be sprayed into the air or which pulls air down with the waste through the downdraft tube. The sedimentation unit is similar to that described previously.

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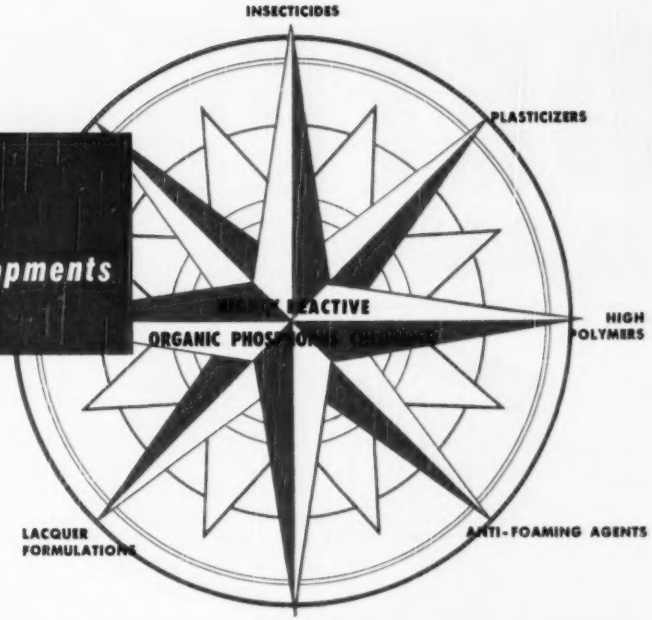
pointing the way to successful new developments



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THE CHEMICAL PANORAMA

NEWS OF THE CHEMICAL PROCESS INDUSTRIES IN PICTURES

PEOPLE

JOHN T. CONNOR, secretary and counsel of Merck & Co., has been appointed vice president by the board of directors. He came to Merck in 1947 from a position with the U. S. Navy.

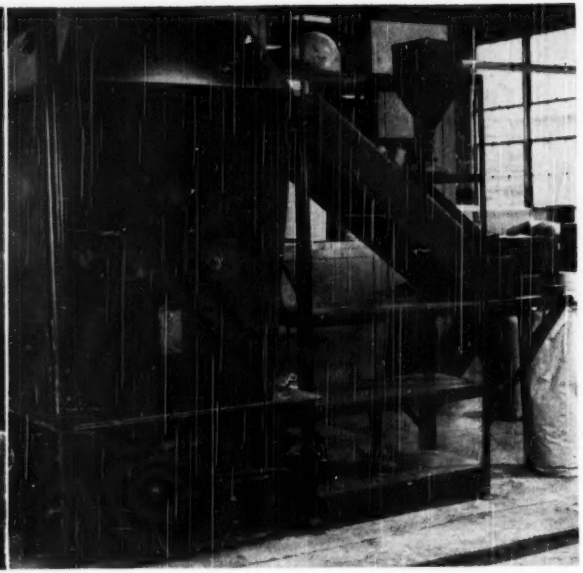
JOHN T. CASTLES, now manager of General Electric's silicone plant at Waterford, N. Y.

FRANCIS J. CURTIS, Monsanto vice president and director, is chemical industry representative on the Advisory Committee on Production Information for the State Department.

← FRED C. FOY became vice president and general manager of Koppers Tar Products Division December 1.

FRANKLIN STRAIN is now acting director of research in charge of Columbia Chemical Division's Barberton laboratories. →

SOLID BINDING RESIN is added to chopped Fiberglas strands to make preform for laminated plastic tray.



OVER-ALL VIEW of preform machine shows chamber at left where fibers and resin are gathered on a shaped perforated screen to make preform of final laminate.

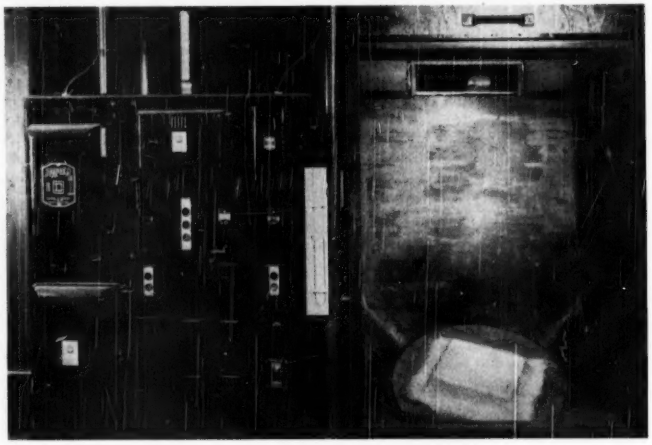
SAFE ON SHELF

Fumaric acid-containing polyester binding resin is solid, has long shelf life even with catalyst added.

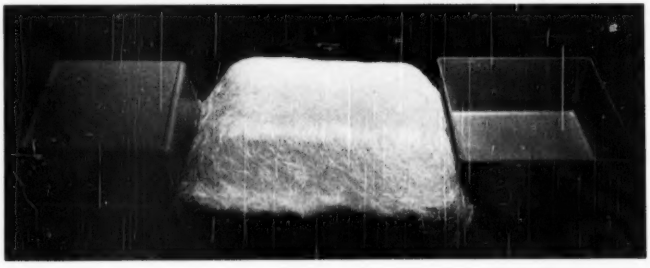
A NEW resin, G-395, has been developed by Atlas Powder Co. for use as a binder in the formation of mats and performed shapes from such fibers as glass, asbestos, paper, cotton, rayon, and other synthetics. It is also useful as a binder in the manufacture of sheets and forms from such materials as cork, sand and wood.

Chief feature of the resin, which is based on fumaric acid, is the fact that it is solid and the formulation containing 3% peroxide catalyst is indefinitely stable in storage. The solid form adds to convenience of application, an example of which—manufacture of preforms for laminated plastic-Fiberglas baskets—is illustrated here.

A modification of the resin contains titanium dioxide pigment, for use where products of exceptional whiteness are desired.



END VIEW of machine (gathering chamber open) shows actual preform formation as fibers and binder are sucked down on screen. Preform is then heated to cure binding resin.



AT CENTER is preform for plastic baskets at left and right. Cured preform is laminated with another type of polyester resin to produce final molded reinforced plastic article.

yourself these questions

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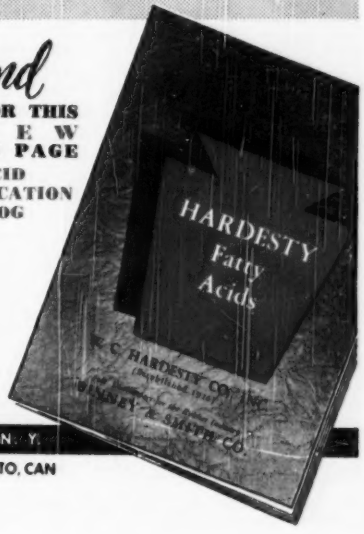

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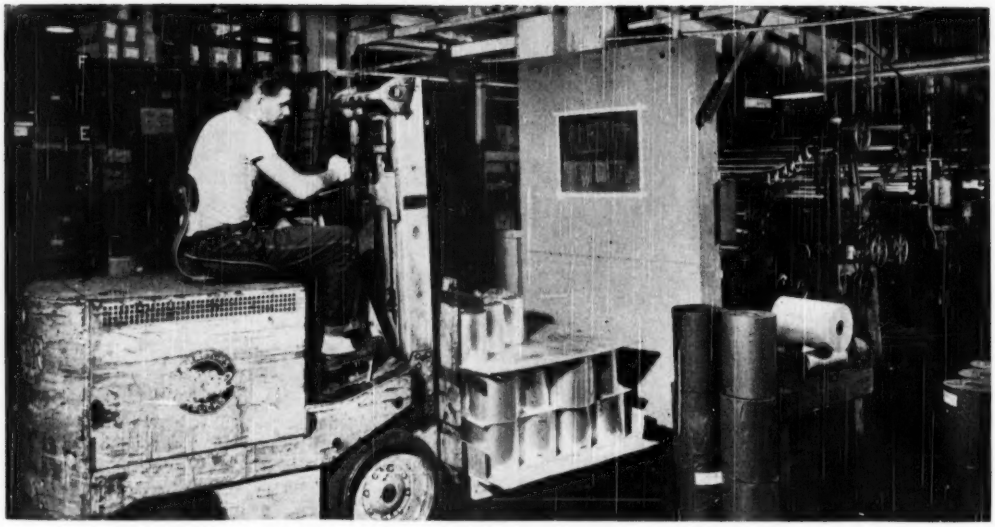

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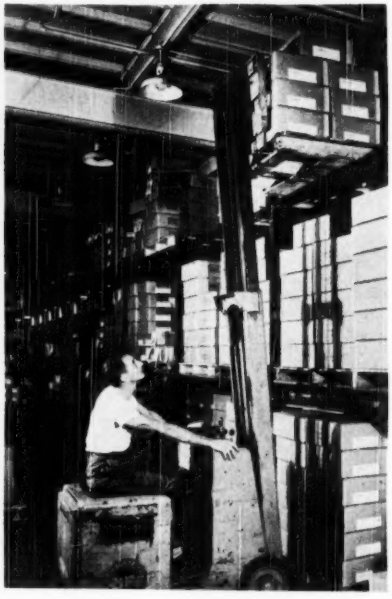

PALLETIZED LOADS awaiting shipment are placed in pallet racks or tiered in other parts of the shipping area.

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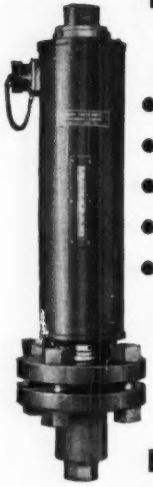

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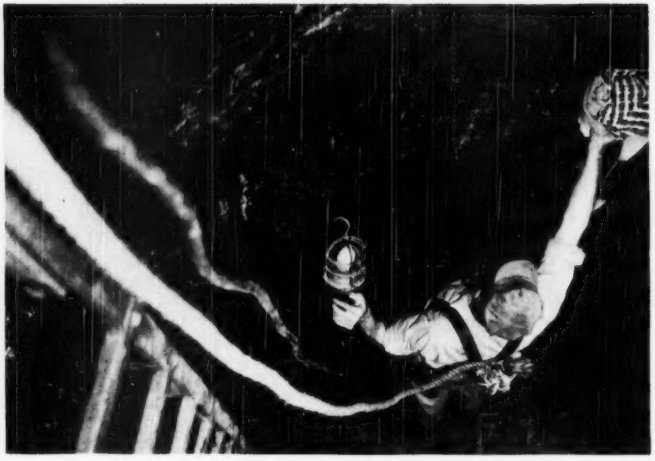
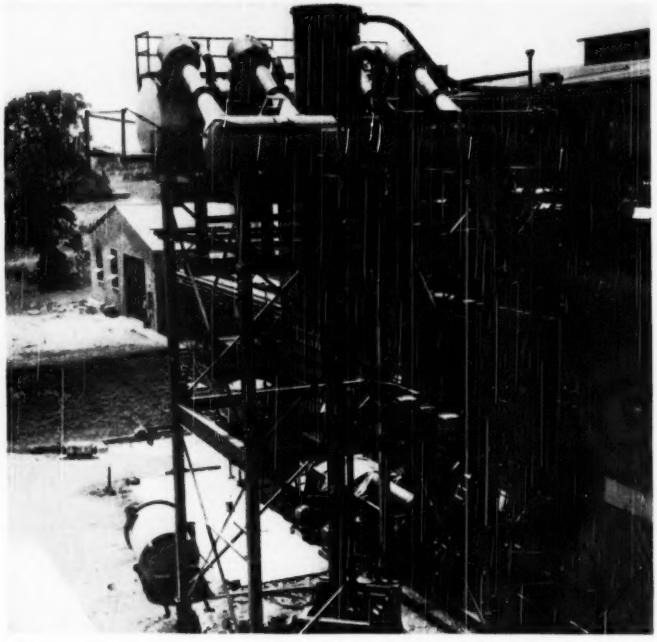


WALLS of a glass-lined blow-down tank are cleaned at Kentucky Synthetic Rubber Corp.

BACK IN HARNESS

THE OLD National Synthetic Rubber Corp. in Rubbertown, Ky., is going back into operation. It will be run by a combination of ten rubber companies under the name Kentucky Synthetic Rubber Corp. The plant has a rated annual capacity of 30,000 tons of rubber of the butadiene-styrene type.



900-ton steam jet refrigeration unit built for Chas. Pfizer's antibiotics plant, Groton, Conn.

COOLED CULTURES

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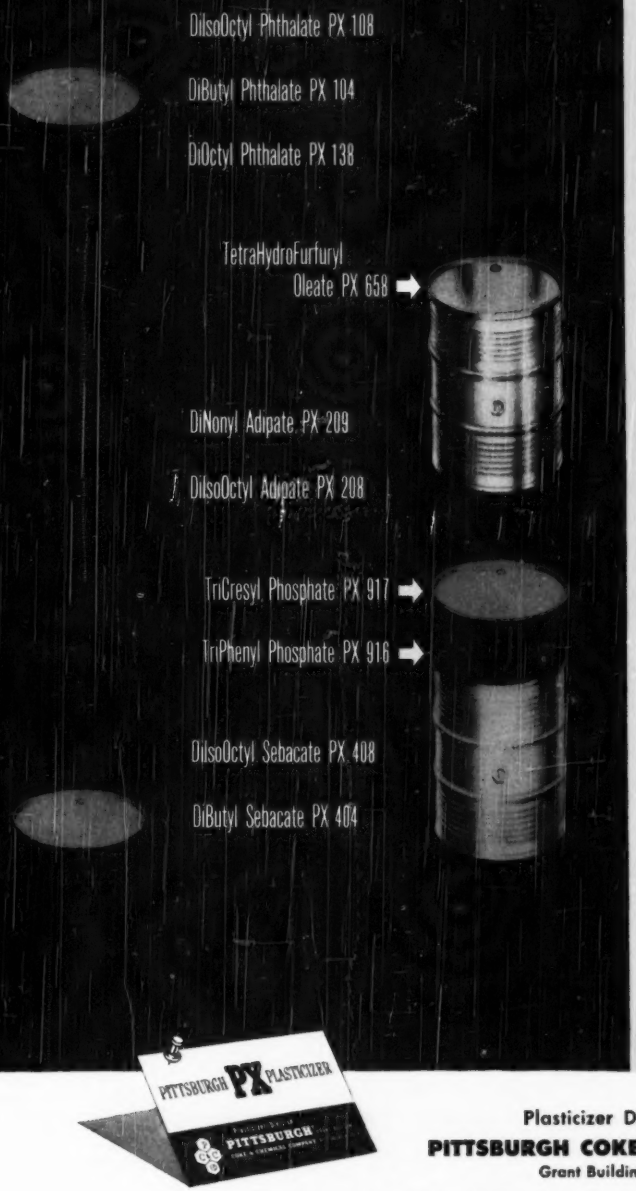
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PX-404 DiButyl Sebacate
PX-408 DilsoOctyl Sebacate
PX-658 TetraHydroFurfuryl Oleate
PX-916 TriPhenyl Phosphate
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The Emulsion Technologist ...like the Gaucho... needs the RIGHT TOOL for a particular job!

EMULSION technologists, like the cowboys of the pampas, need exactly the right tools to make the most of their skill. The gaucho uses his *bolas* to entangle the legs of the swift ostrich. The chemist needs exactly the right emulsifier to mix oil and water or to perform some other function such as wetting or dispersing, penetrating or cleaning. With dozens of emulsifiers to choose from, picking the ideal is not always simple.

To assist the chemist in finding the *right* tool—the *right* emulsifier—for a particular job, Atlas evolved the HLB System of selecting emulsifiers. The HLB System, first of its kind, is based on the Hydrophile-Lipophile Balance of each emulsifier and saves a lot of tedious experimentation.

Atlas makes scores of surface active agents, including the well-known SPAN, TWEEN, ARLACEL, MYRJ, BRIJ, and ATLOX emulsifiers, to fit the particular requirements of a host of different emulsifying, spreading, detergent, and penetrating applications. And we can build *special* emulsifiers to fit a specific need. Why not let us help with *your* emulsifier problems? Write for new booklet showing latest developments in the HLB System of selection.

ATLAS CHEMMUNIQUÉ

Solid Polyester Binders Do Not Discolor

Atlas research has developed new solid polyester resins for binding fibers into desired shapes. The solid form, which contains a catalyst, means complete stability in storage, and the new resins do not discolor on curing. They give excellent wetting action, too, promoting better strength of finished articles made from low-pressure polyester laminating resins. Ask for further information re solid polyesters for laminating as well as binding.

This Might Ease Polyol Shortage for You

Atlas G-2340 polyoxyethylene glucose helps ease the polyol shortage in many non-food uses such as moisture conditioning of fibers, cork compositions, gaskets, leather and paper. It is a water-white, water-soluble liquid, similar to Arlex* commercial sorbitol solution in humectant properties, but less viscous than glycerin. Compatible with sorbitol, glycerin, propylene glycol and other polyols, it is used as an extender for these in many applications.

PYCAL Plasticizers Cut Polyvinyl Film Costs

Two of the Atlas newly-christened PYCAL* plasticizer series show outstanding properties as secondary plasticizers for polyvinyl chloride compositions. Improved heat stability, better colors, better cold temperature flex, and savings in use of primary plasticizers are shown. Ask for data on PYCAL 70 and PYCAL 76.

*Reg. U. S. Pat. Off.

SPAN, TWEEN, ARLACEL, MYRJ, BRIJ, ATLOX—Reg. U. S. Pat. Off.

ATLAS INDUSTRIAL CHEMICALS DEPARTMENT

CHEMICALS ATLAS EXPLOSIVES

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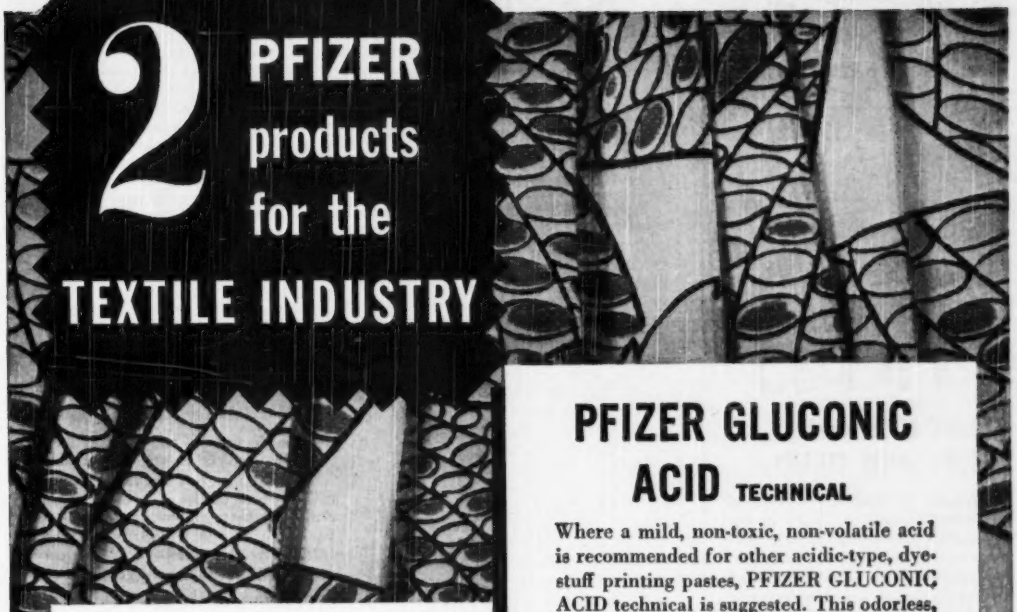
ATLAS POWDER COMPANY, CANADA, LTD., Brantford, Canada

2 PFIZER products for the TEXTILE INDUSTRY



PFIZER AMMONIUM GLUCONATE TECHNICAL

Vat soluble ester printing pastes catalyzed with PFIZER AMMONIUM GLUCONATE technical give brighter, sharper, clearer prints with stronger color values because this new acid-forming catalyst:

1. makes more stable pastes,
2. inhibits dulling action of metallic ions by its sequestering action.

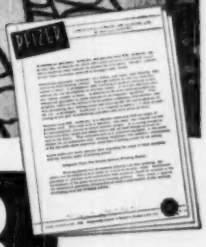
Ammonium Gluconate is a stable, non-toxic, free-flowing and non-corrosive salt which can be incorporated into printing pastes without difficulty. It is marketed as a dry, odorless, readily soluble powder which decomposes upon steaming to yield an efficient non-volatile acidic medium.

Recent experimental work indicates that Ammonium Gluconate can be used as a catalyst for urea-formaldehyde resins.

PFIZER GLUCONIC ACID TECHNICAL

Where a mild, non-toxic, non-volatile acid is recommended for other acidic-type, dyestuff printing pastes, PFIZER GLUCONIC ACID technical is suggested. This odorless, non-corrosive acid is strong enough to form clear, bright and sharp colors, yet mild enough to avoid injury to the fabric. Like its ammonium salt, it also acts as an efficient sequestering agent for metallic contaminants. Used in the preparation and application of acid colloid resins, Gluconic Acid develops no odor and requires no after-wash.

For Technical Bulletin No. 6, samples and prices of both products, write today to: Chas. Pfizer & Co., Inc., 630 Flushing Avenue, Brooklyn 6, N.Y.; 425 North Michigan Avenue, Chicago 11, Ill.; 605 Third Street, San Francisco 7, Calif.



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Thanks to specially developed aromatics used in many of the soaps, detergents, bluings and starches employed in commercial laundering, your finely laundered family linens are now returned *smelling* just as fresh and immaculately clean as they look. Here, as in many fields, the industrial perfume chemist is helping business to make products that *sell* better because they *smell* better. Have you considered *this* sales angle in your selling plans?

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☐ SPRAYS ☐ WAXES ☐ PLASTICS
☐ RUBBER ☐ LATEX ☐ LEATHER
☐ PAINTS or LACQUER ☐ TEXTILES
☐ ROOM or ☐ HOSPITAL DEODORANTS
☐ OTHER PRODUCTS: _____

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NEW SPECIALTY PRODUCTS

Note: This section limited to new finished specialties. New raw materials and intermediates of interest to specialties manufacturers are described in New Chemical Products department.

Fire-Retardant Finish (914A)

Resin finish renders fabrics flame-repellent.

The Textile Resin Department of the American Cyanamid Co. is making a new, durable fire-retardant resin finish for fabrics, called Pyroset, which retains its flame-repellent properties after twenty-five dry or wet cleanings, according to company claims. It is available in several different formulations to suit various fabrics, and has been approved by Underwriters' Laboratories, Inc., and other laboratories.

Pyroset can be applied successfully to a wide range of fabrics, reports Cyanamid, because it has little effect on the hand or feel of a fabric. In addition it is claimed not to become discolored from being hung near heating outlets, making it suitable for use on drapery fabrics, nor to cause skin irritation or sensitivity. Its durability is said to eliminate expensive cost of frequent re-treatments. Treated fabrics have been used by decorators, and further experiments concern its application on dress goods and pile fabrics.

Dust Sealer (914B)

Floor coating seals dust, leaves antiseptic coating.

A new dust-control method of floor care through use of its dust sealer, Antiseptic Westone, has been developed by the West Disinfecting Co., after field tests in industrial plants and other types of buildings and institutions.

The West company claims management has found the use of Antiseptic Westone has resulted in: reduction of costly dust damage to precision machinery and instruments, and to materials and products during manufacturing operations and storage; less absenteeism, because it provides a cleaner, healthier atmosphere; economical restoration of floors to their original beauty; substantial reductions in maintenance costs; generally increased sanitary conditions.

The coating is designed both to preserve floor surfaces and to eliminate dust, thus helping prevent spread of harmful bacteria and viruses. Westone removes dust and leaves an antiseptic inhibiting film. The film holds down subsequent dust for quick and easy removal, states West, an effect of particular value in connection with new concrete and wood floors. Such areas, unproperly treated, give off dust long after being laid.

Claimed easy to apply, Westone is stainless and clean to use with rag, mop, or spray. One gallon covers 4000 square feet.

Impregnating Varnish (914C)

Varnish for electrical units is oil-resistant, flexible at low temperatures.

ABC Impregnating Varnish, newest product of the Frederick S. Bacon Laboratories, is an oil-resistant varnish for electrical units which fulfills the low temperature requirements for aeronautical and military electronic applications, since it does not crack on exposure to —70° F.

Field tests on Air Force instruments treated with films of the varnish showed they had no change in appearance after 48 hours immersion in petroleum base lubricating oil, fluorocarbons, chlorinated diphenyl, etc.

Average electrical properties of ABC are dielectric strength (1/16 inch thick), 500 volts/mil; dielectric constant at 60 cycles, 3.3; power factor at 60 cycles, 0.016; loss factor at 60 cycles, 0.05. The varnish is a three-part product which remains stable when stored in a cool place for four months. After mixing, pot life is at least 24 hours. It is available in 8 ounce units.

Feed Supplement (914D)

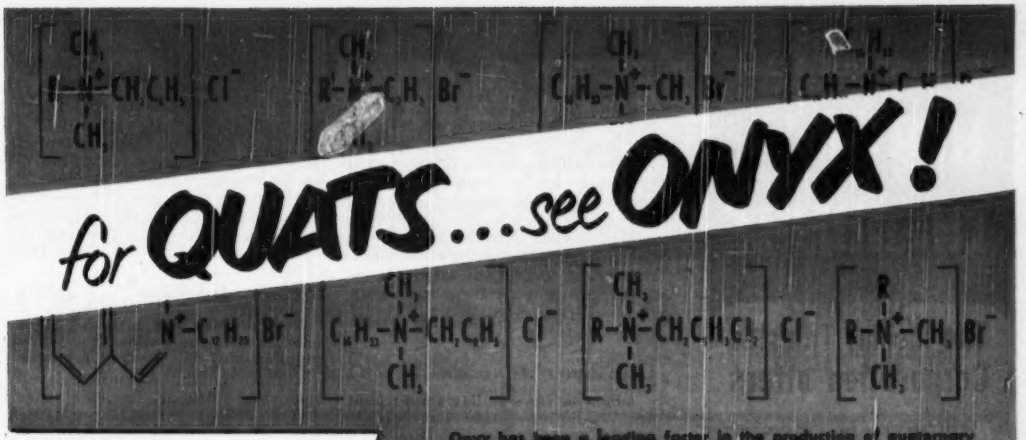
Animal feed supplement contains antibiotic terramycin.

Poultry and swine are to be the chief beneficiaries of a new antibiotic feed supplement, according to its producer, Chas. Pfizer & Co., Inc. Bi-Con TM-5, the name of the product, contains the new drug terramycin.

Development of the product followed tests carried on by laboratories at state colleges and at Pfizer's own laboratories which showed that certain antibiotics residues have the effect of promoting growth of chickens, turkeys and swine. Use of such a product is thus seen to be a factor in producing more economic animal feeds. Containing 5 grams of terramycin per pound, Bi-Con TM-5 should be used by feed manufacturers to the extent of only 2 lbs. per

Do You Want More Information?

CI has made it easy for you to learn more about any item described in this section. Simply encircle the product's identifying number on the Reader Service postcard inside the back cover.



for QUATS ... see ONYX!

Onyx Quaternaries

All Onyx Quaternary Ammonium Compounds now in extensive industrial use have been tested for toxicity—not only on a lethal dose basis, but on a long term chronic toxicity basis. All these tests have shown these compounds to be completely non-toxic at all recommended use-dilutions. Tests have also been made which prove that these compounds do not irritate or sensitize the skin at use-dilutions.

These salts are all cationic. They are therefore compatible with non-ionic and cationic surface-active agents. They are not compatible with soaps or other anionic materials. They are soluble or miscible with water in all proportions. Onyx Quaternaries are stable chemical compounds, and have long shelf life, without deterioration. Rigid manufacturing control insures uniformity of chemical constitution.

Onyx Quaternaries are sold in concentrate form only to producers of compounds for sale to the ultimate consumer. They are not sold direct to the users.

Onyx has been a leading factor in the production of quaternary ammonium compounds since the days when these cationic germicides were first commercially used. Today we produce a greater number of these compounds than any other manufacturer.

Some of the quaternaries we make are of interest to research laboratories and development departments searching for specific germicidal, algaecidal and fungicidal or deodorizing action. Others are available in virtually unlimited quantities, and have wide industrial application. Here are some of the latter group:

BTC*

Alkyl dimethyl benzyl ammonium chloride. The most widely used cationic germicide at the present time. Sold in 50% aqueous solution to disinfectant and germicide manufacturers for dilution and/or incorporation in their own products. The safest and most effective bactericide and bacteriostatic agent available today. Also acts as a powerful deodorant.

TETROSAN

Alkyl dimethyl 2,4 dichloro benzyl ammonium chloride, plus alkenyl dimethyl ethyl ammonium bromide. Sold in 60% aqueous solution. Tetrosan is in extensive use as a disinfecting, deodorizing and preventive antiseptic in veterinary and live stock medicines. It is also used in pharmaceuticals for topical applications where antisepsis is desired.

ISOTHAN Q15*

Lauryl isoquinolinium bromide. Sold in 20% aqueous solution. Isothan Q15 is an excellent fungicide. It is widely used in the formulation of compounds for use in the control of athlete's foot and dandruff. It is also used for various other fungicidal purposes.

ONYXIDE*

Alkenyl dimethyl ethyl ammonium bromide. Sold as a 75% concentrate in isopropanol or propylene glycol. Onyxide is the most effective algaecide now available. It is in very wide use for the control of algae in swimming pools, cooling water, air-conditioning systems and similar applications.

*Trade Mark Reg. U.S. Pat. Off.

If you are interested in any one of these particular "quats," please ask for data. Onyx BTC is covered in a very thorough technical handbook which also outlines the major characteristics of the quaternaries.

onyx

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the finest services for the design and construction of heavy chemical plants. Our experience includes the plants and processes listed below and our facilities are available to you for consultation and contracting on *any* chemical engineering problem *anywhere* in the world.

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Formaldehyde Plants
Fertilizer Plants (all types)
Ammonium Sulphate Plants
Sulphuric, Nitric and Phosphoric Acid Concentrators
Acid Proof Masonry Designs and Materials
Ore Roasting Plants
Acid Sludge Recovery Plants

530

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11 WEST 42nd STREET
NEW YORK 18, N. Y.

ton of feed, to attain practical supplementation level.

In Pfizer tests, supplemented feed showed an increase in growth of 15% in broilers, 10-15% in turkeys, and 10% in swine at market weight. Additional advantages found by the company are declined mortality rates, and decreased needs in the diet of vitamin B-12 and protein. The mechanism by which antibiotics promote growth in animals is tentatively held to be their favorable influence on flora in the animal's intestinal tract, accentuating assimilation of foods.

Case Liner Adhesives (916A)

Adhesives for case liners meet joint Army and Navy specifications.

Case liner adhesives conforming to Joint Army and Navy Specification JAN-P-140 are now being offered by the Industrial Products Division, The Flintkote Co. These adhesives meet the specifications both for strength, mold and fungi resistance and water resistance in use with triplex creped or triplex and pleated barrier materials (as in Type 1), and duplex uncreped, coated, saturated or asphalt infused sheets (Type 2).

Flintkote No. 704 is compounded for slow and fast tack range as required in the specification A and B grades. Thus, these adhesive products fill the needs of military depots and contractors who supply the armed services. They are applied as seam sealers and closures for waterproof paper bags, wrap and case liners.

Textile Finish (916B)

Wrinkle and shrink resistance imparted to cotton and viscose rayon by new finish.

A textile finish that gives durable wrinkle resistance and shrink resistance to cotton and viscose rayon fabrics has been placed on the market by the E. I. du Pont de Nemours & Co., Inc. Trade-marked Zeset, it can be used on spun viscose rayon fabrics, many of which without treatment are not washable. It gives both cotton and viscose rayon a soft, wool-like finish rather than harsh, boardy effects produced by some earlier finishes.

Zeset, states Du Pont, is easily applied, and its use eliminates many problems formerly associated with application of this type of finish. It can be used by any mill possessing efficient padding, drying, heat treating and washing equipment used in applying thermosetting resins. It is diluted by mixing with water. Zeset is stable during storage, and treating baths are stable for days at room temperature.

The finish can be used with Zelan water repellent, and with softening or stiffening agents to modify the hand of fabrics. Cotton fabrics made of combed yarns and mercerized are suited for finishing with Zeset. Applications for it are indicated in treatment of linen and pile fabrics such as transparent velvets, according to the company. A booklet describing its chemical and physical properties is available from Du Pont's Fine Chemicals Division.

Pickling Inhibitor (916C)

New product has high inhibiting action on mineral acids, is odorless and miscible with pickling solutions.

Enthone Inhibitor 8, a new development of Enthone, Inc., is claimed to have high inhibiting action in many types of mineral acids including hydrochloric, sulfuric and phosphoric; lack of odor; complete miscibility with pickling solutions; ease of handling and economy of use.

In addition to inhibiting action of hydrochloric and sulfuric acid as much as 99% at temperatures up to 180° F., according to the manufacturer, the inhibitor lowers surface tension of the pickling solution to result in smaller pendant drops and acid films remaining on the work after pickling. This is said to lower drag-out from 10 to 30% depending upon the shape of the article. It is particularly recommended for pickling of wire, and tests indicate a saving in acid drag-out as high as 30%. This means less use of lime to neutralize dragged-out acid, with a lower amount of calcium sulfate forming on the work.

The inhibitor is said to be readily removed by means of alkali cleaners or good running rinses. Amount of inhibitor used is usually only 0.1 to 0.2% by volume of the acid mixture.

The product is supplied in one-gallon cans and five-gallon and fifty-three gallon steel drums.

Chlordane Formulae (916D)

Emulsion and miscible oil of chlordane available for pest control operators.

Pest Control Equipment Co. is now marketing Lucide A-20, a colloidal emulsion of refined grade chlordane, and Lucide S-60, a water miscible oil containing 60.3% refined grade chlordane. One part of A-20 plus 9 parts water equals 10 parts 2% chlordane emulsion. More highly concentrated, Lucide S-60 in one part to 39 parts of water yields 40 parts of 2% chlordane emulsion.

Lower concentrates as well as ready-to-use insecticides of permanent stability may be made from either, a factor which, according to the producer, makes them suitable for repackaging for over-the-counter

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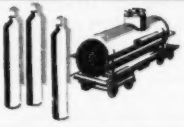
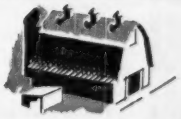


Fluorides



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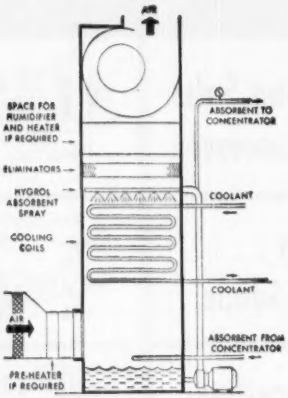
How You Save with the NEW Niagara Method of Air Conditioning

Using "Hygrol" Absorbent Liquid

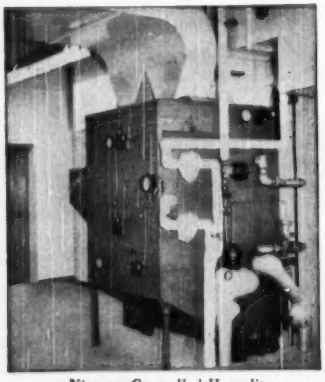
Because it absorbs moisture from the air directly, the new Niagara Controlled Humidity Method uses less, or no, mechanical refrigeration for dehumidifying. You save first costs and installing of heavy machinery. You save space, maintenance expense, power. You get easier, more convenient operation.

Using "Hygrol" hygienic absorbent liquid, this method gives complete control of temperature and relative humidity. Especially, it is a better way to obtain dry air for drying processes, packaging hygroscopic materials, preventing moisture damage to metals, and obtaining better quality for chemical process products and food products—or in obtaining better results in comfort air conditioning for office or laboratory at lower refrigeration costs.



NIAGARA CONTROLLED HUMIDITY METHOD — FLOW DIAGRAM

Food Packaging under Controlled Humidity


Niagara Controlled Humidity Air Conditioner

The diagram shows how filtered air is dehumidified by passing thru a spray of "Hygrol"—a liquid absorbent which removes air-borne moisture. This liquid is hygienic and non-corrosive; it contains no salts or solids to precipitate and cause maintenance troubles. It is continuously re-concentrated at the same rate at which it absorbs moisture, providing always the full capacity of the air conditioner, automatically.

Units provide a range of capacities from 1000 to 20,000 C. F. M. Multiple unit installations are in use successfully. Records of results are available. For further information, write Niagara Blower Co., Dept. CI 405 Lexington Ave., New York 17, N. Y.

(*Advertisement*)

sales. Other advantages cited by the company are residual effect in areas subjected to wetting; no requirement of agitation in making ready-to-use products; fire-proofness; no clogging or harming of brass or stainless steel spraying equipment.

Prices, F.O.B. New York City, range from $3.45 to $5.45 per gallon for Lucide A-20, and from $10.85 to $12.35 per gallon for Lucide S-60, depending on the quantity that one purchases.

Double-Coated Tape (*918A*)

Cellophane tape, coated on both sides with adhesives, is useful for X-ray, photographic work.

Scotch brand double-coated cellophane tape No. 666, the newest product of Minnesota Mining and Manufacturing Co., has a transparent pressure-sensitive adhesive on both sides, protected by a red plastic liner on one side. Reportedly "virtually transparent" to x-radiation, No. 666 does not fog or desensitize photographic plates, and will not bleed into or discolor fine papers.

The tape can be used to mount X-ray intensifying screens in cassettes; to hold two photograph negatives together for registering them together; and to hold objects on vertical panels in studio photography, and for other pictures set-ups. Additional uses cited by the company include splicing paper, joining plastic sheeting, preparing artwork presentations, making blueprint layouts, and mounting small objects on glass "invisibly."

No. 666 has 4½-mil thickness, tensile strength of 20 lbs. per inch of width. It adheres to paper, glass, wood and metal surfaces, and to most plastics. Provided in a 1296-inch roll, it comes in widths of ¼, ⅜, ½, and 1 inch, and in other widths on special order. Distribution is through paper jobbers, and sample rolls are available on request to the company.

• (*918B*) Most of the micro-organisms which cause eye infections can be treated with a liquid **ophthalmic preparation of terramycin**, one of new broad-range antibiotics. In experiments on 15 types of eye infections the drug failed to be effective in about 10% of the cases. The new preparation of terramycin has been developed by Chas. Pfizer & Co.

The drug has been reported especially useful in treating deep-seated eye troubles which may occur in areas difficult to get at. Oral administration often supplements eye-drops. A solution of terramycin in opthalmic ointment has just been made available; it is useful where inflammation and scaling are extensive.

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SODIUM TRIPOLYPHOSPHATE

SODIUM METASILICATE

LIQUID SODIUM SILICATES

NICOTINE

TETRA ETHYL PYROPHOSPHATE

OTHER NEW ORGANIC PHOSPHATE CHEMICALS—on a pilot plant basis—will be announced from time to time

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VIRGINIA-CAROLINA CHEMICAL CORPORATION

Chemicals Division: *401 East Main St., Richmond 8, Virginia*

The *Rare* organic you need in quantity needn't stay rare for you

An organic is in the "rare" class generally because there hasn't been enough demand to justify producing it in quantity. Then, if a commercial idea for it does come along, the rarity means heavy expenditures for the development of production procedures before the idea can be put to work in the plant. Otherwise the organic stays rare.

Now Eastman can break the circle for you. The diversified experience in synthetic organic chemistry, the skilled professional personnel, and the great variety of special equipment that produce thousands of Eastman Organic Chemicals for the laboratory are now at your service for bulk quantity production—even in compounds not currently listed among Eastman's more than 3300 organics.*

We welcome the opportunity to discuss with you procurement problems in any organics not generally available.

**A copy of the new "Eastman Organic Chemicals, List No. 37" is available on request.*

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Also... vitamins A and E... distilled monoglycerides... high vacuum equipment

SPECIALTIES NEWS

Dow Ups Methylcellulose Production by One-Third

The Dow Chemical Co. will increase production facilities for methylcellulose at its Midland, Michigan, plant by one-third. From October 1949 to October 1950 sales of this material have increased by 150 per cent.

Bulk laxative sales are attributed by Dow with being most responsible for the increased demand for the chemical. Several pharmaceutical manufacturers are now quantity users, and are reportedly rapidly winning a substantial portion of this country's $100 million laxative market.

U. S. I. to Build Kansas Pyrenone Plant

At a recent luncheon in Topeka arranged by the Kansas Industrial Development Commission, U. S. Industrial Chemicals, Inc., revealed plans to manufacture Pyrenone insecticides for stored wheat and grain in a new plant in Kansas. Pyrenones are combinations of pyrethrins and piperonyl butoxide. Company president William P. Marsh, Jr., said that the plant will be in production by harvest time next year. The location of the plant has not yet been determined.

Pyrenones can be used on stored wheat and other grains to stop insect infestations. The decision to locate in Kansas is attributed to that state's leading position in production of wheat and the fact that wheat is the carrier for these Pyrenone wheat and grain protectants.

Clorox Opens New Plants

Clorox Chemical Co., manufacturer of Clorox, a disinfectant, deodorant, germicide and bleach based on sodium hypochlorite, is opening a plant in Camden, N. J., and is soon to start construction on another plant in Kansas. Other strategic locations that will help the company combat transportation problems and their attendant high costs are under consideration. The New Jersey addition is its ninth unit, and the one in Kansas will be number ten. Its Tampa, Fla., plant, another in the decentralization program of the company which has its headquarters in Oakland, Cal., was opened in June.

The company had a sales volume of $21,622,000 and a net income of $1,818,221 in the fiscal year ending June 30. This was an increase of $2.3 million in sales and about $293,000 in profits. The decentralization program under way is credited with this increase as well as enabling the company to avoid raising its prices. Further sales and profits are expected as a result of plant expansion.

Added Sources for QM Specs

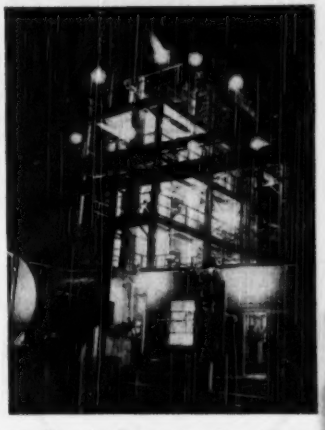
There are now a greater number of sources from which prospective bidders can get Army Quartermaster specifications for any article being procured by one of its procurement agencies. Previously only the agency calling for bids on a particular item would supply specifications. Now prospective bidders may request and receive specifications from any of the following agencies regardless of which agency issues the invitation: N. Y. QM Procurement Agency, 111 E. 16th St., New York 3; Chicago QM Depot, 1819 W. Pershing Rd., Chicago 9, and the Oakland QM Procurement Agency, Oakland Army Base, Oakland 3, Calif.

Allethrin O.K.'d for Aerosols

Formulas containing allethrin have been accepted for use in gas-propelled aerosols by the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture (*CI Newsletter, November 1950*).

S. A. Rohwer, assistant chief of the bureau, reports that thorough studies on the effect of inhaling allethrin have demonstrated that it is comparable in freedom from toxicity with pyrethrins that have long been used in gas-propelled aerosols. Entomological tests have shown that specific formulations containing allethrin and certain other toxicants perform as effectively against mosquitoes, house flies, and perhaps other common household insects as other aerosol formulas that have been accepted and widely used.

The above experimental work has included commercial lots of allethrin with a purity of not less than 75 per cent as determined by the hydrogenolysis method of analysis which was recently accepted as the tentative method of analysis of commercial allethrin. In accepting formulas containing allethrin, Dr. Rohwer pointed out, a requirement will be that the material used be of a purity not less than 75 per cent allethrin. The allethrin content of the commercial product used in preparation of the aerosol should be indicated as determined by the method of analysis mentioned above. The percentage of the related products should also be stated in the formulas submitted for review.



Perchlorethylene production is partially under way at the Barberton, Ohio plant of the Columbia Chemical Division of Pittsburgh Plate Glass Co. This outdoor plant for the dry cleaning and metal degreasing solvent has been under construction since February.

"What's New" Memo

Do you use sodium tripolyphosphate in your detergent formulations? Ethanolamines in shampoo detergents or morpholine in wax emulsions? Are you interested in the dentifrice field? Wax products?

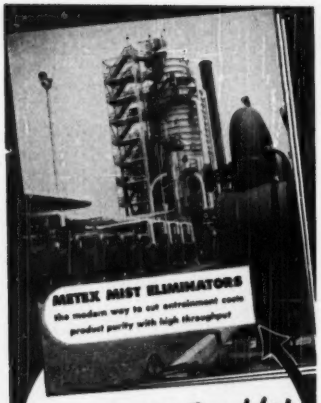
You'll find the latest on these subjects in the following articles in this issue:

"Tripoly Triples," p. 874.
"Crowding Field," p. 878.
"Versatile Vitamin," p. 880.
"Not So Refined," p. 881.

Merck Makes Cortisone Generally Available

Merck & Co., Inc., has made its brand of cortisone, Cortone, generally available through distributors, hospitals, institutions, and pharmacies for use by the physician in daily practice. Since July 1950 Cortone has been available on a limited basis, and distribution had been through hospitals only.

The company has also reduced the price to a suggested list price of $35 a gram to physicians. The price charged to hospitals during the past few months has been $50 a gram. The price has been reduced through research and process improvements



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so that it is now less than one-fifth that charged to investigators a little over a year ago.

In rheumatoid arthritis, where prolonged treatment with cortisone is usually required, clinical investigations now indicate that almost all patients can be maintained on one-tenth of a gram a day, with some requiring as little as one-twentieth of a gram a day.

Kolker Adds DDT Unit At Houston Plant

Construction is now under way on a new DDT unit at the Houston, Texas, plant of Kolker Chemical Works, Inc., Newark, N. J. This addition will be operated in conjunction with an existing BHC plant. Production is expected to be available early in 1951.

The company also makes DDT at its Newark plant, and the new facilities will greatly increase overall company production. The new unit is located conveniently with respect to the large consuming market of the southwest which requires DDT for use on cotton and other crops.

Atlas Requests Reopening FDA Hearings

Atlas Powder Co. has filed a motion with the U. S. Federal Security Administrator to reopen the record incident to the proposed standard of identity for bread and other baked goods. The tentative standard does not include Atlas products Span 60, Tween 60, and Myrj 45 as optional ingredients, while competing chemical emulsifiers, mono- and di-glycerides, are included among those permitted in baked goods.

The motion states that the tentative findings of the hearings held before the Food and Drug Administration, discriminate against Atlas products because the same criteria, standards and tests were not applied to competitive types of emulsifiers.

Atlas points out that during the hearings it confined its efforts to presenting evidence to show why its materials should be included as optional ingredients, without attempting to discredit competing emulsifiers. The company complains that manufacturers of mono- and di-glycerides introduced evidence solely to lead to exclusion of Atlas products, and that the FSA was misled by these tactics.

In its petition for reopening the hearings, Atlas asks to be able to present material evidence, the need for which it says could not reasonably have been anticipated before the announcement of the tentative decision. It states that the evidence will prove that mono- and di-glycerides when used in the amounts allowed under the proposed order, have distinct softening effect on bread; these softening effects are completely unrelated to the amount of shortening used; bread containing mono- and di-glycerides feels as soft as bread containing Atlas emulsifiers; and evidence as to safety of mono- and di-glycerides is neither as complete nor as persuasive as that regarding Atlas products.

In addition, the company presents these additional grounds for reopening the hearings: lack of evidence in the record concerning FDA's own tests of safety, and lack of evidence supporting the tentative requirement that mono- and di-glycerides be pre-mixed with shortening.

No "DO" Ratings for Maintenance Chemicals

Regulation 2 of the National Production Authority which provides for assignment of ratings for defense orders does not permit extension of ratings to procure maintenance or operating supplies. Manufacturers of such maintenance chemicals have wondered whether "DO" symbols may be used in ordering such supplies for plants producing materials on rated procurement orders. The New York Quartermaster Procurement Agency has stated that these symbols may not be used for this purpose, and that the ratings cannot be extended in this fashion to get such supplies.

New Alabama Plant for Agricultural Chemicals

A new plant for blending, formulating and production of agricultural chemicals is being readied by the Pennsylvania Salt Manufacturing Co. at Montgomery, Ala. The building itself is being erected by Montgomery Industries, Inc., a group of business men sponsored by that city's chamber of commerce, and is being leased to Pennsalt.

From this plant, Pennsalt will make available to growers in the Southeast, a complete line of agricultural chemicals for use on cotton, peanuts, soybeans, potatoes and other crops and on livestock. Many of the products will be new additions to Pennsalt's line.

Aerosols Subject of ACS Meeting

Production and application of sprays and aerosols will be discussed at the American Chemical Society's Seventeenth Chemical Engineering Symposium at Johns Hopkins University, Baltimore, on December 28 and 29. The Society's Division of Industrial and Engineer-

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Boiling Point, °C (760 mm.).	111
Flash Point (Tag Open Cup), °F.	65
Solubility in water, 20°C (wt. %).	ca. 0.01

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ing Chemistry will sponsor the meeting. The aerosol principle has been used for applying everything from insecticides to shaving cream.

Papers dealing with the basic aerosol theory and techniques and data on the performance of equipment in commercial processes will be presented at the symposium.

Wood Preservation Off Slightly in 1949

Wood-preservation statistics for 1949, as compiled by Henry B. Steer of the Forest Service, U. S. Department of Agriculture, show that the total volume of wood given preservative and fire-retardant treatment was about 1% less than in 1948, according to the American Wood-Preservers' Association. Volume in 1949 totaled 291 million cubic feet compared with 292 million cubic feet in 1948. All time high was 362 million cubic feet treated in 1929.

The South, with more than 40% of the plants, treated about half of the total U. S. production. Texas leads the states in number of plants with 21, Louisiana is second with 17, and Washington is third with 16.

In 1949 the industry consumed a total of about 238 million gallons of oil preservatives and 7.8 million pounds of solid preservatives. This compares with 235 million gallons and 10.6 million pounds (including 1.6 million pounds for fire retardant treatment) consumed in 1948.

The quantity of wood given fire-retardant treatment in 1949 was 8,038,637 board feet, 16% less than was reported for 1948.

Among liquids used in wood treatment were creosote petroleum solution, creosote coal-tar solution, creosote petroleum solution fortified with pentachlorophenol, creosote petroleum solution fortified with copper naphthenate, straight creosote and petroleum pentachlorophenol solution.

Solids consumed included straight zinc chloride, chromated zinc chloride, Wolman salts, Celcure, pentachlorophenol (in solution), copper naphthenate (in solution), Osmose, Protexol and Minalith.

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Open New Corrosion Testing Station in N. C.

Representatives of more than 100 industrial companies and government officials attended last month's formal opening of the new Harbor Island addition to the Kure Beach corrosion testing project near Wilmington, N. C. The project is operated under the direction of the corrosion engineering section of The International Nickel Company, Inc.

With the new laboratory and marine exposure racks which have been added at Harbor Island, the Kure Beach project now has increased facilities for the study of over 20,000 specimens of all types of materials in sea water and sea air. It is believed to be one of the largest projects of its type in the world.

Among the more than 20,000 specimens under test are specimens of metals, alloys, non-metallic materials and protective coatings—including paint—and even rope.

Information and data on means of fighting corrosion are freely exchanged between companies that sometimes have competitive products. Much of the research at the station is directed toward the solution of corrosion problems for U. S. Government service.

Propylene Glycol Seen Best Glycerine Substitute

Representatives of two leading drug associations have stated that even if glycerine shortages grow acute, a substitute should not be used in drug products "unless absolutely necessary." At a combined meeting of the American Drug Manufacturers Association and the American Pharmaceutical Manufacturers Association, in Washington,

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Good-rite glacial acrylic acid possesses these outstanding properties:

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- In addition to use in emulsion or aqueous solution polymerization, it can also be used as a monomer or comonomer in polymerization conducted in organic solvents, or in bulk polymerization.
- It can be used to modify many types of thermosetting resins.
- Being "dry", it greatly facilitates preparation of salts of acrylic acid, both metallic and ammonium.
- Many addition reactions with the double bond of acrylic acid are facilitated by anhydrous conditions.
- It is more stable during shipment and storage than the water solution.

For further information, and prices for Good-rite glacial acrylic acid, please write Department CD-2, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco.

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members agreed, however, that propylene glycol is the best replacement for glycerine. But they fear it, too, may soon be scarce.

New Rodenticide Reaches Consumer Level

Rax Powder, Prentiss Drug & Chemical Co., Inc.'s, new rat and mouse killer containing warfarin, is now being used in commercial rat control programs. Following successful tests, rodenticides containing warfarin were released for consumer sales (*CI, August 1950, p. 232*), and Prentiss' Rax is now being offered for repackaging or for professional use at the following bulk prices: 5-lb. packages, $2.15 per lb.; 25-lb. drums, $2.05 per lb.; 50-lb. drums, $1.95 per lb.; and truckloads (50-lb. drums), $1.65 per lb. On quantities of truckloads and over, Prentiss is offering an advertising allowance to non-consuming and processing customers submitting a plan of advertising, sales coverage and publicity meeting with approval of the manufacturer.

Rodenticides containing warfarin kill by producing hemorrhage. It is slow-acting, and must be consumed by the rodent over several days to kill. At the concentration used, it is tasteless and odorless. Consequently rats and mice do not develop bait shyness to the product and eat it until enough to cause death has been consumed. Warfarin is the discovery of Karl Paul Link of the University of Wisconsin, and is protected by a patent owned by the Wisconsin Alumni Research Foundation. It previously was called WARF Compound 42.

Prentiss has just issued a new booklet on Rax which is available on request to the company at 110 William St., New York 7, N. Y. It gives a complete description of the product.

U. S. to Make World-Wide Mildew Treatment Tests

Extensive tests to discover better ways of protecting cotton fabrics from rot and mildew will be made cooperatively during the next few years in various parts of the world by the Army Quartermaster Corps and the U. S. Department of Agriculture. They are expected to provide the most reliable data ever obtained on the effectiveness of such fungicidal treatments for cotton.

Tests fabrics will be treated with various fungicides and other chemicals at U. S. D. A. laboratories and will be studied at four exposure stations to obtain data on their performance in different atmospheres. One station will be in New Orleans, where data on performance in a humid, subtropical climate will be obtained; one will be at Las Cruces, N. M., to get data on a hot, dry climate; and two will be overseas, probably in the Caribbean and South Pacific areas, to get test data under the most severe tropical conditions.

Because of the large losses of materials through destructive action of fungi and molds on tentage, clothing and other equipment during World War II, the Quartermaster Corps has been studying the problem in conjunction with the U. S. D. A. and a number of compounds have proved effective in the laboratory in preventing such deterioration. These field tests under actual conditions will give data for comparison with these findings and to determine accuracy of methods used in predicting fabric resistance to rot and mildew.

Brazil Insecticide Imports

Slightly more than 42,000 metric tons of insecticides will be imported into Brazil by the end of the current year through normal trade channels. More than 32,000 metric tons, valued at more than $3 million, will have come from the United States. This quota is separate from the two special quotas recently established for import of American DDT, BHC and sulphur worth more than $2 million.

• **American Chemical Paint Co.**, Ambler, Pa., has just issued a bulletin entitled "ACP Phosphate Coating Chemicals and Processes." It covers paint-bonding, rust proofing, protection of friction surfaces and methods of improving drawing and extrusion.

• **The Pennsylvania Salt Manufacturing Co.** has opened a new sales office in Berkeley, Cal. Making their headquarters at the new office will be R. A. Snyder, who will do technical sales service work for metal and maintenance cleaners in industries of California, and J. Cameron Siddall, who will handle technical sales and service for agriculture in California, Arizona and New Mexico.

• **Insul-Mastic Corp.** of America has added the following licensees to its national organization: Insulation Engineers, Inc., Mobile, Ala.; Industrial Roofing & Sheet Metal Co., Cleveland, O.; R. F. Zimmerman & Co., Shreveport, La.

• **Five major producers** in the industry have become members of the National Printing Ink Research Institute, Lehigh University, Bethlehem, Pa., during the past year. Over

(Turn to page 976)

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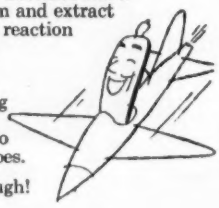
EMPLOYER: Amazing! But what do you do today?

AMMONIA: I grow farm crops, make ice, purify water, produce explosives.

EMPLOYER: I know you are a fertilizer, a refrigerant, and . . .

AMMONIA: Yes, and I serve as a protective atmosphere to surface-harden and anneal vital parts of planes and automobiles. I neutralize acid in petroleum and extract metals from ores. I'm a solvent and reaction medium in organic synthesis, a nutrient for yeast and a processing agent in the manufacture of alkalis, rayon, dyes, butadiene, and catalysts for cracking petroleum. I'm used in making vitamins, sulfa-drugs and radio and television parts and tubes.



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Patent Law Revision Under Way

(Continued from page 885)

13. Is the term for which a patent is granted changed?

No. The terms of a patent is for 17 years from the date of its grant.

14. Will transfers, licenses, and other agreements relating to patents have to be recorded in the Patent Office or in any other Government agency?

No. While such a proposal was presented in the "Committee Print" no such provision is contained in H.R. 9133.

15. Does the bill establish a single court of patent appeals?

No. Apparently this has been left for subsequent presentation. There have been proposals that there be created such a court in order to establish and maintain harmony in judicial interpretion of patent questions.

16. Will taxes have to be paid in order to maintain patents?

No. Under the present law a patent is granted for 17 years to the inventor free and clear to do as he pleases with it within the law.

17. Will the owner of a patent have to give a license for a fair price to anyone who desires its use?

No. The bill does not provide for any so-called system of compulsory licenses.

18. Before a patent is granted will the application be published and the submission of pertinent facts by interested parties be invited?

No.

19. Can an interested party bring proceedings to cancel a patent?

No. However, under present law the United States Government can bring cancellation proceedings on the ground of fraud or misrepresentation in obtaining a patent.

20. Are the fees for obtaining patents changed by the new bill?

No. Application fees and final fees remain the same at $30 each as long as the claims do not exceed 20 in number. If an appeal has to be taken from a decision of the Examiner to the Board of Appeals, the fee would be $25 instead of the present $15.

21. Can an owner of a patent obtain an injunction to prevent violation of his patent rights?

Yes. This has not been changed by the proposed bill.

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NEW TRADEMARKS

From Official Gazette—Vol. 637, No. 4

STAYBRITE. For tissue paper treated to prevent tarnishing of silverware and used for wrapping the same. 529,659. Multicolor Gravure Corp.

From Official Gazette—Vol. 638, No. 1

TOBACINE. For insecticide. 573,111. Anco Laboratories.

EXELOL. For insecticides and agricultural fungicides. 573,353. California Spray-Chemical Corp.

CLARASE. For enzyme clarifier to convert starch materials, etc., to dextrines, maltose, dextrose, amino acids, and glycerides. 575,179. Takamine Laboratory, Inc.

UNILAN. For chemical compound used in wool and worsted processing and manufacture. 578,165. Quaker Chemical Products Corp.

TESALT. For chemical weed killers. 581,383. The Sherwin-Williams Co.

SEPTIFEED. For powdered preparation to maintain effective bacterial activity in septic tanks etc. 582,333. Max H. West Co.

CONAP. For wood preserver. 585,720. Phoenix Oil Co., Inc.

TRIVEX G-9. For insecticide. 586,531. Food Machinery and Chemical Corp.

SUFFO. For animal and insect repellent and germicidal and insecticidal deodorant. 588,854. Compo Co.

TON INK. For varnish additive to printing ink. 576,963. Allied Litho Supply Co.

SPLENDOR. For varnish. 539,783. Stetson Paint & Varnish Co.

(SYMBOL). For paints and related materials. 556,628. Frost Paint & Oil Corp.

HI-FASHION COLORS. For interior paints. 557,273. The Glidden Co.

CYCOPOL. For resinous plastic materials for use in paints and allied preparations. 562,016. American Cyanamid Co.

FASHION COLOR. For flat oil paints. 563,548. Sapolin Paints Inc.

CENTRAL. For paints and allied materials. 568,295. Central Paint & Varnish Works, Inc.

POLYPRENE. For baking enamels. 572,501. Interchemical Corp.

TUNGROC. For spar varnish. 573,997. Tung Oil Products, Inc.

AN PRO FAC. For vitamin mixture for poultry, live stock, and other feeds. 569,650. Valley City Milling Co.

SUCARYL. For cyclohexylsulfamate used as a non-caloric sweetening agent. 581,461. Abbott Laboratories.

(SYMBOL). For disinfectant. 515,784. Polk Miller Products Corp.

CANFIELD NON-SKID SORB. For granular sweeping preparation for absorbing oil and grease. 563,234. Canfield Oil Co.

DUBLE POWER. For chemical powder to prevent sulfation of lead plates and to lower freezing point of acid in H_2SO_4-containing batteries. 574,220. Duble-Power Chemical Co.

RHODY. For flat paint, underbody for enamel, and enamel paint. 577,157. Westcott, Slade and Balcom Co.

From Official Gazette, Vol. 638, No. 2

CELLOWAX. For cleaning and polishing composition. 524,950. The Cellowax Co.

MARLO. For disinfectants and a variety of pharmaceutical products. 509,858. Marlo Products Co.

A JOHNSON'S WAX PRODUCT. For wax and wax products. 531,679. S. C. Johnson & Son, Inc.

MIRROR GLAZE. For cleaners, polishers, and finish preservers. 544,369. Mirror Bright Polish Co.

LUPOLINE. For cutting, grinding, tumbling, and polishing compounds. 551,643. Associated Engineering Co.

BLU-GLU. For flexible glue. 586,664. Swift & Co.

EVERHOLD. For glue. 586,665. Swift & Co.

KAY-BEE. For chemical compound used as rust and scale inhibitor in automobile engine coolants. 568,804. Kool-Block System, Inc.

MERCURY. For laundry bleaching compound with cleaning properties. 569,077. Mercury Chemical Co.

ISO-QUIN. For liquid disinfectant having germicidal and fungicidal properties. 584,323. The Cramer Chemical Co.

ALDEHOL. For chemical product for denaturing alcohol. 586,999. Kay-Fries Chemicals, Inc.

ARTLINE. For printer's inks. 569,024. Tourangeau Ink Co.

H.F. For self-hardening organic resin, used as a bonding cement for acid-proof brick or tile. 549,655. The Pennsylvania Salt Manufacturing Co.

INTENSOCOTE. For interior and exterior paints. 532,872. Patek Brothers, Inc.

REP-QUIK. For paint enamels and quick drying varnish stains. 541,459. Republic Paint & Varnish Co.

NU-HUE. For paints and painters' materials. 555,281. The Martin-Senour Co.

KROX. For color pigments having use as a coloring material in paints. 562,484. Minnesota Mining & Manufacturing Co.

XX. For zinc oxide for use in paints. 568,268. The New Jersey Zinc Co.

PEMCO. For ceramic colors. 568,974. Pemco Corp.

N-F-R. For synthetic resin base finishes and associated finishing materials. 575,130. The Egyptian Lacquer Manufacturing Co.

V & S. For ready-mixed paint and allied materials. 575,892. Cotter & Co.

ARCOTUM. For waterproof structural and exterior paint. 577,923. The Arco Co.

DARAPHANE. For surface coating compositions. 579,083. Dewey and Almy Chemical Co.

LANDAU. For paints and paint materials. 584,461. J. Landau Co.

PINE-TEX. For cleaner, used primarily for industrial floor maintenance. 558,364. The Cudahy Packing Co.

HI-SPEED. For non-saponaceous detergent having water softening properties especially for cleansing metal dairy equipment. 561,895. Diamond Alkali Co.

CUE. For soap. 568,096. Colgate-Palmolive-Peet Co.

ASSISTEX. For dry cleaning soap compound. 572,529. Takamine Laboratory, Inc.

COIN. For detergent for general cleaning purposes. 574,807. Armour and Co.

FAZT. For washing machine soap. 582,072. Continental Soap Corp.

SPORBAN. For mold delayer for general bakery pastries, consisting of benzenecarboxylic acid and derivatives, propylene glycol. 557,393. Sche Rose Mfg. Corp.

KARSPRAY. For liquid disinfectant. 563,881. West Disinfecting Co.

AQUA-FLAKES. For amylaceous-base product in flaked form, to be mixed with water for use as an adhesive. 565,801. National Starch Products, Inc.

BLADE WYPE. For wax solvent grease remover for use in cleaning razor blades and similar products. 569,697. 14 Plus Safety Razor Co.

FRUIT SET. For hormone spray powder used in ripening of fruit. 573,293. Chipman Chemical Co., Inc.

HOLLAND HOUSE. For all metal anti-rust cleaner and polish. 573,127. Holland House Obelite Chemical Industries, Inc.

BOSTWICK. For insecticide room deodorant, moth proofing composition, fire extingushing composition. 573,829. Bostwick Laboratories, Inc.

DRI NON WARP. For animal glue base adhesive, sold in dry form. 579,882. National Starch Products Inc.

From Official Gazette, Vol. 638, No. 3

PETROBOL. For hydrocarbon plasticizer. 510,211. Standard Alcohol Co.

METALACE COPPERTONE. For coating compositions. 518,963. Maas & Waldstein Co.

KEN. For oil base drilling fluid concentrate. 583,697. Ken Corp.

CEDARINE. For wax polish and cleanser for furniture, walls, floors, and automobiles. 541,769. O-Cedar Corp.

KOCOTENE. For automobile polish and automobile wax and polish. 561,026. Kocolene Co., Inc.

GRIP-WAX. Floor wax. 581,360. Scientific Supply Co., Inc.

SUP-R-GLOSS. For liquid wax floors. 582,331. V. Jack Vincent.

SOLAFLOR. For shoe polish. 584,121. Hollywood Shoe Polish, Inc.

SOBILICATE. For abrasive burnishing and polishing compounds. 584,583. Lupo Research Laboratories.

BLUE RIBBON. For gummed tape, gummed cloth and gummed paper. 567,403. Hudson Pulp and Paper Corp.

COLEX. For glues and gelatins in powder for adhesive use. 581,122. Consolidated Chemical Industries, Inc.

5 IN 1. For laundry bleach and brightener. 556,184. Hardin Chemical Co., Inc.

LEWIS' DIXIE. For lye. 565,448. The Pennsylvania Salt Manufacturing Co.

DRESSODOR For preparation for use in deodorizing wound dressings and sick rooms. 567,545. Sharp & Dohme, Inc.

CARBO SIL. For deoxidizing powder for addition to molten metal. 568,891. American Metallurgical Products Co.

(SYMBOL). For rust proofing and rust inhibiting chemicals for preparing metals and chemicals for treating metals as an aid to drawing. 569,471. Parker Rust Proof Co.

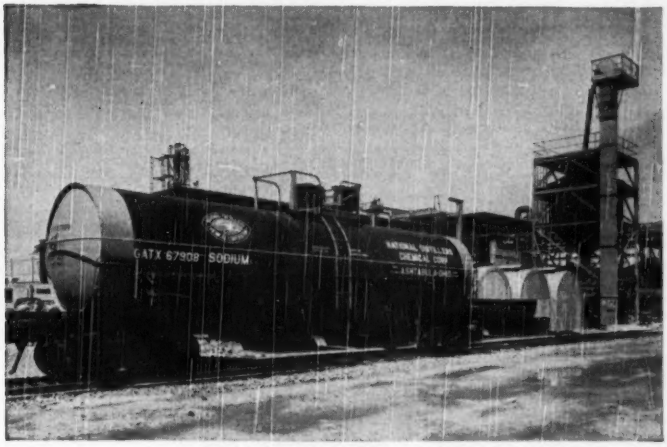
KRALASTIC. For synthetic latex and resin composition. 570,528. United States Rubber Co.

LEA. For addition agents for electroplating solutions. 572,436. The Lea Manufacturing Co.

HERO. For fire extinguishing compositions, insecticides, and room deodorants. 573,227. Bostwick Laboratories, Inc.

National Distillers CHEMICAL CORPORATION
ASHTABULA, OHIO
news

Metallic Sodium by Tank Car Aids Handling and Storage



A typical Sodium tank car of 80,000 lb. capacity, ICC class 105-A-300-W

One of the most interesting facts about Sodium—especially where large-scale users are concerned—is that it can be shipped by tank car, unlike other metallic elements. Its low melting point (97.5°C.) makes this possible. Metallic Sodium is shipped in an insulated tank car which is equipped with coils formed by channels welded directly to the outside of the tank wall for circulation of heating or cooling oil.

Molten Sodium is drawn into the car by vacuum, solidified by the circulation of cooling oil, and then sealed under a nitrogen atmosphere.

Unloading Is Simple

At the customer's plant, unloading a Sodium tank car is a relatively simple procedure. Hot oil, from a steam-heated exchanger, is circulated through the tank car coils to melt the Sodium. The molten Sodium is withdrawn by vacuum into a heated weigh-tank, which is sized to meet process requirements. From the weigh-tank, Sodium is fed to the process by gravity flow through heated lines. The melting of an 80,000 lb. car normally takes from 10 to 15 hours.

Aside from the usual economies offered by tank car shipments, an additional advantage may be gained by using the tank car as the sole means of Sodium storage. Where the user has his own, or leased, railroad facilities, the Sodium tank car method completely eliminates the need for internal storage capacity.

This Sodium tank car method of storage has been used successfully for many years by large consumers. The technical staff of National Distillers will be pleased to assist users in setting up Sodium tank car handling and storage procedures.

Truckload or Carload Sodium is Available at Base Price

With the entry of National Distillers Chemical Corporation into the manufacture of Metallic Sodium this year, the same base price on brick shipments has been applied to both truckloads of 14,000 pounds or more, and carloads for shipment at one time.

This base price structure for Sodium bricks, plus National Distiller's central location at Ashtabula, Ohio, assure rapid and economical delivery to all customers, regardless of size.

Metallic Sodium in brick form is shipped in drum lots as molded, uncoated bricks of 1, 2½, 5 and 12½ pounds each, packed dry in open-head steel barrels, each containing 290 pounds net.

These 55-gallon steel Sodium barrels are accepted for full credit when returned to National Distillers in good condition via freight collect.

Removing 12½ lb. brick from barrel

Sodium Dispersions Increase Reaction Rates & Control

The development of Sodium Dispersions represents the most interesting advance in Sodium chemistry during recent years. In dispersion form, the surface area of the Sodium particles available for reaction or catalytic effects is increased tremendously. The use of Sodium in this fine state of subdivision results in improved reaction control and makes possible the commercial utilization of many reactions formerly limited to the laboratory.

The increased reactivity of Sodium in this form offers these advantages: 1) increased reaction rates, 2) lowered reaction temperatures and pressures, 3) increased yields, and 4) decreased side reactions. Detailed information concerning Sodium Dispersions is available upon request.

Chemicals with APPEAL

Aromatic Chemicals play an increasingly important role, not only in the field of chemistry and industry but practically in all facets of everyday living. Chemicals impart aesthetic importance and sales appeal. They have become an important adjunct of advertising, promotion and merchandising. Chemicals are utilized to make products look good, smell good, taste good and, quite often, feel good to the touch. Chemicals too, express and reflect the tempo and reality of the day like our literature or our movies or television.

For more than 150 years, Dodge & Olcott has devoted its research laboratories and its talents in the development of chemicals to improve American products and to give them greater appeal.

D&O

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ESSENTIAL OILS • AROMATIC CHEMICALS
PERFUME BASES • VANILLA • FLAVOR BASES

NEW TRADEMARKS—

(SYMBOL). For preparations for fire extinguishers; insecticides; disinfectants for automobile specialties; hydraulic fluids; paper and textile impregnants and coatings; and coating for fruit and vegetables. 574,773. R. M. Hollingshead Corp.

(SYMBOL). For termite solutions and other insecticides. 586,235. Chemtox Co., Ltd.

(SYMBOL). For emulsifiable concentrate of chlordane. 589,290. U. S. Insecticides Co.

PENNSALT PRFK. For self-hardening organic resin composition, used as a bonding cement for acid-proof brick or tile, and ingredients for preparing such cement. 549,660. The Pennsylvania Salt Manufacturing Co.

(SYMBOL). For gypsum plaster, gypsum stucco, and gypsum joint and crack filler material. 552,801. Standard Gypsum Co.

SOFTWOOD. For plastic patching substance for wood. 561,502. Sears, Roebuck and Co.

PROTEK-SEAL. For asphaltic compound for use as a moisture and water-proof seal on all types of water-proof paper. 578,960. The Davison Chemical Corp.

COAT-O-LITE. For interior paints in liquid form. 539,607. Minnesota Linseed Oil Paint Co.

(SYMBOL). For cable paint, anti-fouling paint, and other paints and allied materials. 566,585. Edward Smith & Co.

TIRE-WITE CLEANER. For pumice soap for cleaning automobile tire walls. 530,745. Los Angeles Soap Co.

BUB-L. For synthetic detergent for cleaning metal and non-metal surfaces. 557,169. Chester Whitfield Smith.

CLIPPER CLEANER. For inorganic detergent having water softening properties for general washing purposes. 561,892. Diamond Alkali Co.

(SYMBOL). For soap. 575,483. N. V. Haarlemsche Stoomzeepfabriek Het Klaverblad.

KLASS. For soap and detergent used as a deodorant cleanser. 579,101. Emil C. Horn.

SILVATOL. For cleaning, cleansing, and detergent chemical compounds in liquid, powder, and/or paste form of general utility. 580,923. Ciba Ltd.

COSILBRA. For liquid metal cleaner. 582,886. Burke & Hancock.

SUPER-KOTE. For aluminum, bronze, and gold powder, and oil paints. 503,396. The Sheffield Bronze Paint Corp.

PURAFIDE. For medicated adhesive powder for holding artificial dentures in the mouth. 564,749. Wernet Dental Mfg. Co., Inc.

CHIPPENDALE. For varnish. 553,434. Valentine & Co., Inc.

KOTE-O-TIN. For tinning compound. 572,110. Metal Mender Products, Co., Inc.

BRUSH CRAFT. For exterior and interior house paint and enamels for porches and floors. 572,386. The Steelcraft Manufacturing Co.

From Official Gazette, Vol. 638, No. 4

PERFECTONE. For liquid wax polish for furniture, etc. 557,195. S. C. Johnson & Son, Inc.

HILCO LUSTRE. For self-polishing, quick drying liquid wax coating for wood and composition floors. 570,963. Hillyard Chemical Co.

HYDRO-CIDE. For sanitizer for drinking water of poultry. 563,112. The Corn King Co.

DIOKEM. For sanitizing, germicidal and deodorizing compound adapted primarily for dairy use. 564,991. Diversey Corp.

O-B. For air purifying, deodorizing, medicating, or perfuming cakes or tablets for use in a vaporizing device. 587,839. Costello-Mausure, Inc.

(SYMBOL). For fertilizer. 591,342. Atlas Chemical Co.

PARABOND. For ready-mixed paints. 586,427. The Patterson-Sargent Co.

CANADAY DRY CLEAN-O-WAX. For automobile polishers. 506,732. Canaday Chemical Works.

HYDRO-PLASTIC. For plastic cement used for plastering. 552,380. Southwestern Portland Cement Co.

HUNT'S. For shampoos and "bubble bath" soaps. 572,883. Bauer & Hunt, Inc.

WAX-SEEL. For moisture-proof thin flexible paper sheets. 582,642. The Munising Paper Co.

From Official Gazette, Vol. 639, No. 1

"X". For automobile cooling system and boiler system specialties for leak sealing, rust and scale prevention and removal, etc. 521,709. "X" Laboratories, Inc.

WEEDMASTER. For chemicals for killing noxious weeds and plants. 503,584. Michigan Chemical Corp.

PANAPOL. For drying or semi-drying oils and synthetic resins. 548,682. Pan American Refining Corp.

(SYMBOL). For liquid bed bug killer. 568,797. B. Heller & Co.

(SYMBOL). For incense, insecticides, disinfectants, fumigants, moth proofing preparations, household and clothes bleach, laundry, starch, photographic chemicals, chemical water softener, and room deodorant. 570,154. B. Altman & Co.

FLEBO. For deodorants for industrial or household use. 570,696. Chemische Fabriek "Flebo".

POROTOX. For fungicides and insecticides for control of rose plant diseases. 577,683. Potomac Rose Society.

CHLOROWAX. For chlorinated paraffin wax. 579,021. Diamond Alkali Co.

SUNOLITE. For waxes used in compounding rubber to prevent atmospheric and/or sunlight checking. 590,446. Witco Chemical Company.

TOTANIN. For tanning extracts. 580,908. A/S Toten Cellulosefabrik.

PHENIX. For flameproofing compositions for textiles. 581,043. Textile Proofers Inc.

TAL. For tablets in a container for absorbing odors and moisture. 582,850. Natalie of Hollywood Inc.

NOPCOL. For leather finishing compounds. 585,673. Nopco Chemical Co.

NOPCOLENE. For fat-liquoring and finishing compositions. 585,674. Nopco Chemical Co.

NOPCOWITE. For composition for fat-liquoring leather. 585,676. Nopco Chemical Co.

HAMICOTE. For white paste for use as textile fiber size and lubricant, rust preventive and drawing compound for metals. 586,920. Haas-Miller Corp.

RAM PAK. For metal impregnant to form tight barriers within pores and pore channels of metal castings. 588,496. Kirk White Chemical Co.

BBZ-200. For composition used as a brightener in electroplating solutions. 589,653. Hanson-Van Winkle-Munning Co.

GRO-ALL. For insecticides and fungicides in solution form. 590,140. Central Chemical Corp.

GACO. For chemicals used in the graphic arts industry. 590,223. Jones Graphic Products Co.

GAOLITH. For chemicals used in the graphic arts industry. 590,224. Jones Graphic Products Co.

UNITROL. For soil conditioner. 559,072 Union Oil Co.

STIM-U-PLANT. For plant food. 572,543. Agricultural Laboratories, Inc.

VALLEGREEN. For fertilizer. 574,882. Armour and Co.

V-GREEN. For fertilizer. 577,357. Armour and Co.

(SYMBOL). For fertilizer. 577,621. Tennessee Corp.

ORANGE BELT. For agricultural fertilizer. 586,557. Lyons Fertilizer Co.

GREEN HILL. For fertilizer. 588,487. Grocery Store Products Co.

PENNSALT PRF. For self-hardening organic resin composition, used as a bonding cement for acid-proof brick or tile, and ingredients for preparing such cement. 549,658. The Pennsylvania Salt Manufacturing Co.

(SYMBOL). For ready mixed oil paints, and related materials. 520,273. Allied Dealers Supply Co.

INHIBITITE. For liquid primer for metallic surfaces to be painted. 536,165. Seidlitz Paint & Varnish Co.

MANSION. For paint enamel, ready mixed paint sold in liquid form, and varnish. 538,075. Armstrong Paint & Varnish Works.

SPANISH MAIN. For paint enamels in liquid and paste form. 539,775. Stetson Paint & Varnish Co.

MULTI-SPAR. For varnish, liquid varnish stains, and wood stains. 540,879. Republic Paint & Varnish Co.

REGENT. For ready-mixed paints sold in liquid form, and allied products. 540,889. Republic Paint & Varnish Co.

ZAPRIME. For surface primers and sealers. 557,818. Atlas Powder Co.

BERRYKLEER. For lacquers. 557,994. Berry Brothers, Inc.

FASCO. For ready-mixed paint. 569,557. Fasco Industries, Inc.

LUMILUSTRE. For semi-gloss enamel. 587,545. Gulf States Paint Co.

ZIP. IT'S OFF BECAUSE IT'S OUT. For chemical hair remover. 574,841. Jean Jordeau.

DEFENSO. For general cleaning or washing compound. 566,547. John Sexton & Co.

(SYMBOL). For soap. 568,630. Johnson & Johnson.

SOILMASTER. For dishwashing compounds. 571,796. Economics Laboratories, Inc.

SO NU. For cleaning preparation soluble in water for laundry and general household cleaning. 582,087. Legion Chemical Co.

BILLOS. For rug and upholstery cleaner. 585,334. Lasswell's Furniture Studio.

(SYMBOL). For whitewall tire cleaner. 585,551. Swaco Products Corp.

GRIFFIN FURNITURE POLISH. For furniture polish. 554,227. Griffin Furniture Polish Co.

FLOR-DYE. For penetrant which simultaneously colors and acts as a binder for cement floors and for chemicals used for floor dressing fixing said penetrant to provide polish to cement floors. 559,460. Devoe & Raynolds Co., Inc.

321 STAINLESS

An Assured Supply Lower Cost Technical DATA*

*The assurance of a continuous supply of Titanium to make stabilized austenitic chromium nickel steel...plus the economic advantage of the lower price of type 321 has focused increasing attention on its other outstanding features. Among these are excellent high temperature properties, thermal shock resistance and ease of drawing and forming.

In the "as-welded" state, as normally used, 321 shows a high order of corrosion resistance in a variety of corrosive media. It is being used effectively in many installations with type 347 weld rods used in welding.

* In developing the Low Carbon Ferro Titanium alloys used in making 321 stainless, TAM has acquired much worthwhile technical data. Therefore, although we do not supply steel, we can supply you with information of value. Write our New York City Office.

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NEW CHEMICAL PRODUCTS

Hydroxystearic Acid And Glyceride (934A)

Emery now produces hydrogenated castor oil and corresponding acid on commercial scale.

Emery Industries, Inc., is now in commercial production of 12-hydroxystearic acid and hydrogenated castor oil.

12-Hydroxystearic acid is an 18-carbon saturated fatty acid with a hydroxyl grouping on the 12th carbon atom. The presence of this reactive hydroxyl radical produces unique chemical and physical properties, and makes this product very promising as a chemical intermediate for synthesis of new products. One major established use is in the manufacture of lithium base lubricating greases, with many more specialty uses, such as esters, soaps, alkanol amine salts, being suggested.

Emery's product is a hard, amorphous, solid fatty acid with a capillary melting point of approximately 73° C. The free fatty-acid content as a 300-molecular-weight fatty acid is 95% minimum. Other characteristics are low iodine value and light color.

Hydrogenated castor oil is a hydrogenated triglyceride consisting of approximately 85% of combined hydrogenated ricinoleic acid (12-hydroxystearic). It is a hard amorphous solid with a melting point of approximately 82° C. and an iodine value of 5.0 maximum. In addition, color is light and acid value low.

Principal use is in lubricating greases but it shows promise in many specialty uses such as impregnating and insulating agents for electrical products.

Alkyd Resins (934B)

Three new paint resins introduced by General Electric's Chemical Department.

Three new General Electric Glyptal alkyd paint resins were introduced this month. Manufactured by G.E.'s Chemical Department, these include a fast-baking resin designated as 2522 for industrial finishes, 7300 for architectural finishes, and 7310 for industrial finishes.

G-E Glyptal resin 2522 is a fast-drying, hard, tough resin that combines excellent adhesion and gloss and color retention, with chemical resistance, weather resistance, and flexibility. General Electric engineers have developed numerous suggested paint formulations utilizing 2522 resin, which include heat-resistant paints for stoves, air-drying finishes for room interiors, general purpose paints for venetian blinds and related products, and home appliance paints for washing machines and refrigerators. G-E 2522 is compatible with amine resins, but for many applications their addition is not required.

G-E Glyptal resin 7300 is a general purpose alkyd with improved gloss-retention designed for architectural applications, including interior gloss enamels, furniture, and exterior enamels.

Designed as a rapid, tough-baking vehicle for industrial type finishes, G-E Glyptal resin 7310 has excellent weather resistance, increased color-retention, and is recommended for a wide variety of metal products including farm machinery, machine tools, and gasoline pumps. It may also be used for air-drying enamels.

Silicone Rubber (934C)

New G-E material is easier to mold, has improved properties.

A new silicone rubber compound developed by General Electric Co.'s Chemical Department permits rubber fabricators to mold silicone rubber parts more easily and with highly improved mechanical and thermal properties.

Designated as 81223 compound, this new G-E silicone rubber is outstanding for its ease in processing. Many parts can be fabricated from it without prolonged oven cure and it has excellent molding and extrusion properties after only a five-minute warm-up. Because of the outstanding hot tear strength of G-E 81223 silicone rubber, parts with undercuts can easily be removed from molds; and being neutral in color, stock can be colored for product identification purposes for individual fabricators.

Fabricated parts obtained with General Electric's new silicone rubber compound have high tensile strength, high elongation, excellent electrical properties, and are serviceable over a wide temperature range (550° F to —85° F).

Many new applications for silicone rubber mechanical goods, including diaphragms, boots, sleeves, belting, hose, and mountings, are anticipated as a result of the improved molding characteristics and improved properties of General Electric's new compound.

Do You Want More Information?

CI has made it easy for you to learn more about any item described in this section. Simply encircle the product's identifying number on the Reader Service postcard inside the back cover.

Wetting Agent Improves Concrete (934D)

Use of wetting agent in concrete mix gives denser, stronger product.

Denser, stronger and more uniform concrete blocks and bricks result from the addition to the mix of small amounts of a surface active agent, it is reported by Monsanto Chemical Co.

The chemical, a liquid wetting agent also employed in household and industrial cleaning compounds, is said to permit the use of less water by increasing its efficiency, thus producing a so-called "dry" concrete of greater strength. At the same time the plasticity required to properly mold blocks and bricks is improved.

In addition, the wetting agent is said to result in cleaner equipment, lighter colored products and better dispersion of cement.

About eight ounces of the chemical are added to a five-bag cement mixture, either before or after the cement. About one-third of the water required is added at the same time and mixed thoroughly.

Non-Ionic Detergents (934E)

Series of 100%-active non-ionic detergents developed by Wyandotte includes flaked solid.

A 100%-active flake non-ionic detergent has been developed by Wyandotte Chemicals Corp.

This solid surface-active agent is one of an entirely new series of non-ionics developed by Wyandotte Chemicals. These new detergent products, commercially named Pluronics, will be offered for many special applications, such as wool scouring, dishwashing, home and commercial laundry operations, and certain metal cleaning processes, where the non-ionics have proven to be more satisfactory than the anionics. Particularly effective in hard water areas, the Pluronics are expected to increase the efficiency of operations in commercial laundries and textile mills.

Until now, non-ionic detergents have only been offered in the form of liquids, pastes or wax-like solids, which severely limited their application. By using a hydrophobic unit not previously used in detergent manufacture, Wyandotte Chemicals' laboratories were able for the first time to produce a solid non-ionic.

ANNOUNCING...

The Western plant and facilities
of W. C. HARDESTY CO., INC.
at Los Angeles, have been acquired by
Vegetable Oil Products Company, Inc.,
and will operate as

VOPCOLENE DIVISION OF
VEGETABLE OIL PRODUCTS COMPANY, INC.

The fatty acids and specialty products manufactured by this plant will be marketed under the new distinctive trade name VOPCOLENE. *We invite you to write for a brochure describing properties of these* VOPCOLENE *products.*

VOPCOLENE DIVISION
VEGETABLE OIL PRODUCTS COMPANY, INC.
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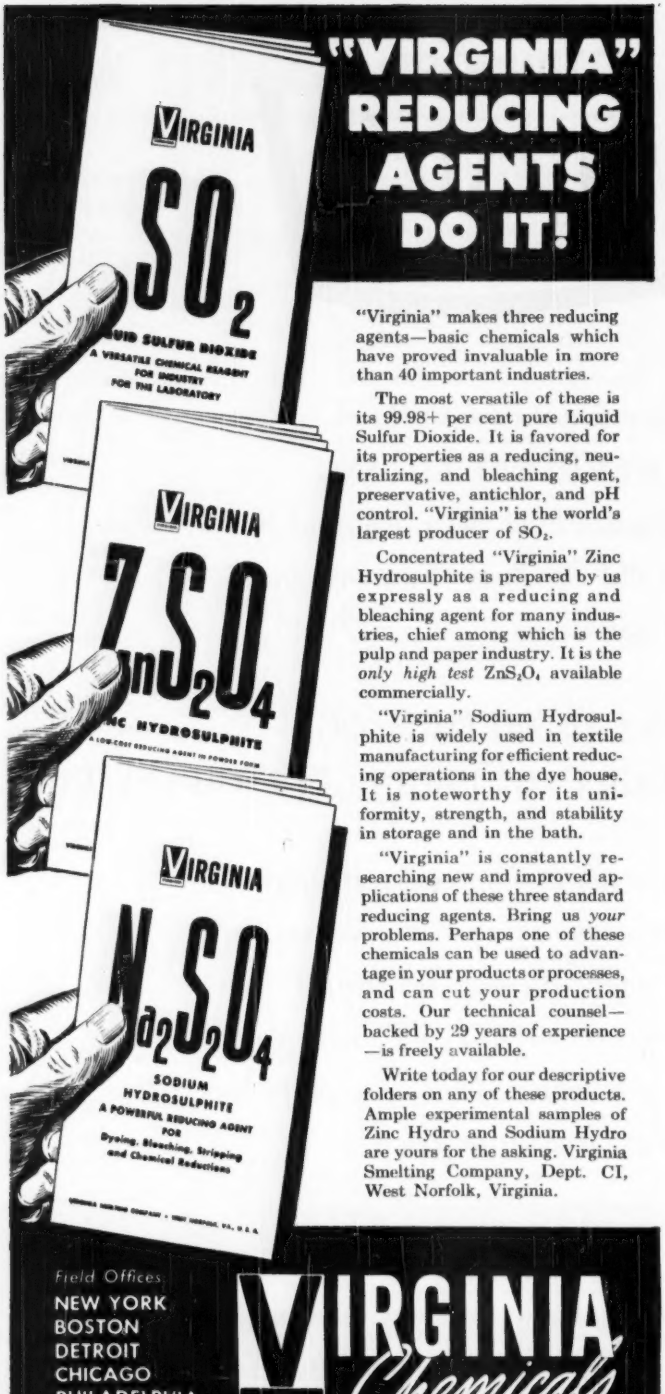
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VIRGINIA
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LIQUID SULFUR DIOXIDE
A VERSATILE CHEMICAL REAGENT FOR INDUSTRY FOR THE LABORATORY
VIRGINIA
ZnS_2O_4
ZINC HYDROSULPHITE
A LOW-COST REDUCING AGENT IN POWDER FORM
VIRGINIA
$Na_2S_2O_4$
SODIUM HYDROSULPHITE
A POWERFUL REDUCING AGENT FOR
Dyeing, Bleaching, Stripping and Chemical Reductions
"Virginia" makes three reducing agents—basic chemicals which have proved invaluable in more than 40 important industries.
The most versatile of these is its 99.98+ per cent pure Liquid Sulfur Dioxide. It is favored for its properties as a reducing, neutralizing, and bleaching agent, preservative, antichlor, and pH control. "Virginia" is the world's largest producer of SO_2.
Concentrated "Virginia" Zinc Hydrosulphite is prepared by us expressly as a reducing and bleaching agent for many industries, chief among which is the pulp and paper industry. It is the only high test ZnS_2O_4 available commercially.
"Virginia" Sodium Hydrosulphite is widely used in textile manufacturing for efficient reducing operations in the dye house. It is noteworthy for its uniformity, strength, and stability in storage and in the bath.
"Virginia" is constantly researching new and improved applications of these three standard reducing agents. Bring us your problems. Perhaps one of these chemicals can be used to advantage in your products or processes, and can cut your production costs. Our technical counsel—backed by 29 years of experience—is freely available.
Write today for our descriptive folders on any of these products. Ample experimental samples of Zinc Hydro and Sodium Hydro are yours for the asking. Virginia Smelting Company, Dept. CI, West Norfolk, Virginia.
Field Offices
NEW YORK
BOSTON
DETROIT
CHICAGO
PHILADELPHIA
ATLANTA
VIRGINIA
VIRGINIA Chemicals
SINCE 1898

Based on this new unit, a wide variety of 100%-active non-ionics may be made, ranging in physical form from liquids to a solid of sufficiently high melting point to be flaked on commercial equipment.

The Pluronics have remarkable flexibility: The physical form and surface-active properties may be varied to provide the user with the surface-active agent most suited to his specific requirements. Eventually, the series will include as many products as may be required to cover adequately all of the major fields of application. Pluronic F68, the dust-free flake, will find additional use wherever a 100%-active non-ionic detergent would be the best type of surface-active agent to use and where the liquid or paste physical form is not desirable.

Each of the products presently included in the series is available in pilot-plant quantities. The rate of manufacture of the Pluronics will soon be increased to full-scale commercial production. Samples are available upon request from the firm's Development Department.

Acetovanillone *(936A)*

Lignin derivative has potential application as intermediate, sunscreening agent.

A process for the manufacture of acetovanillone (3-methoxy-4-hydroxy acetophenone) has been developed by Marathon Corp. Chemical Division. This compound is now available in pilot-plant quantities.

Attractive possibilities for its use as an intermediate in the synthesis of pharmaceuticals, food preservatives, fungicides, antioxidants and other organic compounds are indicated. Acetovanillone's high absorption of ultraviolet light, up to 3050 Angstrom units, suggests its possible use as a sunscreening agent.

Samples are available from the manufacturer.

• New methods of using x-rays and electrons in laboratory investigations of metals, paints and oils have been described by Dr. Jean-Jacques Trillat, Director of the X-ray and Electronics Laboratory of the French National Scientific Research Center. A new apparatus measures the angle of incidence of x-rays to surface films and allows calculation of the film thickness. This technique also permits study of oxidation, identification of alloys, and effects of polishing. Another technique permits preparation of a metal surface in a vacuum whereafter it is machined, also in vacuum, within an electron diffraction chamber. Study of adsorption, rust and tarnish formation, machining and similar physics-chemical phenomena is facilitated by this technique.

NO WONDER SHIPPERS INSIST ON HACKNEY 2-PIECE ACID DRUMS

for Shipping Sulphuric Acid, Aqua Ammonia, Caustic Potash, Hydrofluoric Acid and Other Corrosives

THEY LAST LONGER! Extra trips are built right into Hackney 2-Piece Acid Drums! Their seamless, cold drawn construction makes them last longer than the conventional 3-piece container, provides greater economies in the long run.

CONSTRUCTION MAKES THEM TOUGH! There are no longitudinal or chime seams—only one circumferential weld located between and protected by two I-bar, rolling hoops. Bung failures are minimized by heavy forged spuds attached by a two-pass weld. Extra strength and prolonged life are added by reinforced chime protectors. After complete fabrication, controlled heat-treating increases resistance to corrosion.

THEY'RE ALWAYS UNIFORM! You'll find every Hackney Acid Drum uniform in size, weight, strength and capacity. And no wonder! Only superior materials are used, after they are properly analyzed by expert metallurgists. Rigid inspections are made after every stage of production.

THEY'RE EASY TO CLEAN! No dirt or foreign matter can contaminate your product, for Hackney Drums are easy to clean. Interiors are smooth, entirely free of cracks and crevices.

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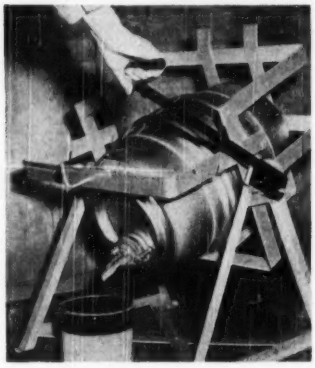
CONTAINERS FOR GASES, LIQUIDS AND SOLIDS

NEW EQUIPMENT

Barrel Tilter (938A)

New tilter for stainless steel barrels has ratchet position control.

The new safety tilter produced by Gen. Scientific Equipment Co. with pouring spout provides a safe, fast and convenient method of draining liquids from stainless steel barrels. The cradle and supporting base are



made of structural steel. A locking device holds the tilter at any angle for pouring for operation by one man.

The new rubber and plastic tubing safety air vent pouring spout insures an even flow of liquid without spurts or splashes. Flow capacity is 5 gallons per minute.

Self-Cleaning Filter (938B)

New filter uses a water flush in conjunction with nylon brushes for cleaning.

A new self-cleaning industrial filter, Model SC, has been introduced by the Sparkler Mfg. Co. The filter is designed for filtering where large amounts of solids are involved and where it is difficult to open the filter for cleaning.

The cleaning arrangement consists of nylon brushes set between the unit's circular filter discs. Ends of the brushes are connected to a revolving brush cage that extends the length of the filter.

When the filter requires cleaning, water is flushed through the filter to the outlet drain, while this cage is revolved either by hand or motor power. Thus, the brushes, which are in contact with the discs on either side, sweep these surfaces clean. All matter that has accumulated on the discs drops to the bottom of the filter and is quickly washed through the outlet drain. In many applications, complete cleaning has been accomplished in only two to five minutes.

The filtering unit consists of a series of circular discs mounted on a hollow center shaft and enclosed in a horizontal cylindrical pressure tank. Each disc is perforated on both sides and is covered by a synthetic cloth which is sealed around the edge. Spacer rings between discs hold the cloth in place. The depth of this ring may be varied in accordance with the thickness of cake desired. When using filter aid, only a very short time is required for precoating, since a rather dense, woven nylon cloth can be used if desired.

High Pressure Gasket (938C)

New high-pressure gasket streamlines jointed connections and reduces turbulence in flow of fluid.

The new high-pressure gasket of Flexitallic Gasket Co. (Style CGI) is a compression gauge type with an inside and outside ring. It has a spiral-wound construction with alternating V-crimped plies of metal and filler.

In every pipe the skin friction sets up eddies in the fluid passing through. This friction is increased as the fluid pushes into the recess between flanges. With the new Flexitallic Gasket, the steel ring practically fills the flange recess and reduces turbulence.

The inside ring also provides a compression gauge which supplements the outside ring. It prevents radial movement of the gasket under extremely high bolt loads and minimizes gasket contamination from highly corrosive fluids.

The new Style CGI Gasket is made for practically all standard ASA and API fittings as well as special designs. Pressure range is 150 to 2500 psi. In addition to stainless steels, the inside ring can be made with other premium metals such as monel, nickel or Inconel. Ring thickness depends on flange face finish, as well as the yield factors of the gasket proper.

The gasket is designed so that the inside ring can be conveniently remounted in new replacement gaskets as an economy measure. The inside ring is also being used with the self-centering type of gaskets.

A wide choice of metals and filler materials are available, including Teflon.

Do You Want More Information?

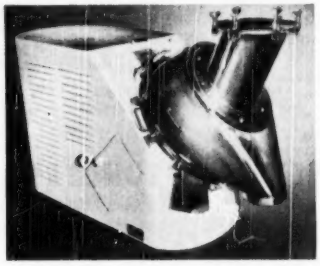
CI has made it easy for you to learn more about any item described in this section. Simply encircle the product's identifying number on the Reader Service postcard inside the back cover.

Angle Disintegrator (938D)

New disintegrator is completely demountable.

A new angle disintegrator reduces the possibility of contamination in disintegrating, mixing, and homogenizing operations, according to its manufacturer, Rietz Mfg. Co. The working parts are immediately and completely demountable. Take-down and assembly time for the new model is a few minutes, which makes rapid sterilization of all working parts possible. A major feature is the design factor which makes it physically impossible for lubricant to admix with the through-put.

The angle disintegrator retains the Rietz dual discharge feature through



which disintegration-resistant material is separated from the primary product and passes by gravity through the hammers and out the secondary discharge, eliminating power-consuming recycling. The Rietz 360° screen insures a constant flow of properly-sized material at a minimum temperature rise. The belt drive replaces the direct drive of the vertical units. Rotor speeds now range from 7200 to 16,000 rpm in the smaller units and from 3600 to 7200 rpm in the larger units. All parts of the standard machine are of stainless steel.

Ball Mill (938E)

New ball mill has slightly tapered shape for improved grinding.

Hardinge Co., Inc. is now producing its new "Tricone" ball mill. The important feature is its slightly tapered shape, which keeps the larger grinding balls at the feed end of the mill. It has the good fea-

Geared to meet modern industrial needs!

Today's complex process industries call for an infinite variety of fine and special chemicals. To serve them, Baker & Adamson has geared its production facilities to manufacture a host of quality chemicals in any quantity from ounces to tons. Thus, B&A can meet your requirements anywhere from laboratory development to commercial operations.

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tures of the Hardinge conical mill and provides additional room for smaller grinding media at the discharge end with virtually the same floor space requirements.

Structurally, it consists of: a conical or convex feed head; a short cylindrical section; a long tapered conical section; and a wide-angle conical or convex discharge head. Since the body of the mill is basically a union of three truncated cones of varying degrees, the name "Tri-cone" was chosen. The cylindrical section is omitted entirely in some cases.

The major operating advantages are proper ball segregation—the large balls remain at the feed end to crush the coarse incoming material; maximum energy is gained at the feed end where diameter is greatest and where greatest crushing force is needed; convex heads increase ball turbulence; the nearly spherical shape provides maximum working volume for minimum liner surface.

Rotary Batch Mixer (*940A*)

New mixer reduces dusting during operation.

Worthington Pump and Machinery Corp. has developed a batch mixer with the Ransome mixing action which eliminates dust during discharge of batch by a dustproof housing enclosing the discharge chute. The sealing joint packing on discharge side of drum revolves with the drum. The discharge housing portion of the seal remains stationary. Packing is kept in place by a retaining ring accurately bolted to true center of drum with adjustment provision for keeping packing tight.

To eliminate dust during mixing period a sealing disc is furnished attached to inner side of discharge chute, completely closing discharge opening while mixing. Spring and bearing on outside of sealing disc keep disc centered at all times. A simple adjustment furnished allowing "take-up" to provide for wear.

Sedimentation Tank (*940B*)

New sedimentation tank is a hemisphere mounted on a cone.

The design of sedimentation tanks for hot process water softeners has been radically changed by Graver Water Conditioning Co. The customary standard cylindrical shape of such tanks with dished top and conical bottom has been a compromise between functional and structural ideals. Functional requirements are a large capacity in a shape that provides low rising rates and largest possible settling area for the treated water. To satisfy these functional standards, the conventional cylindrical tank must be heavily built and strongly reinforced to take care of the resulting physical stresses. Such tanks are therefore extremely bulky and costly.

The new tank, the Graver Sphericone, is a hemisphere mounted on top of a cone. The low weight inverted cone provides the uniformly increasing area from tip to circular top necessary for correct functioning of the tank, while strength is provided by the hemisphere.

• (*940C*) A new lightweight **explosive gas detector,** the Probetector, is now being manufactured by Atlas Exploration Co. Readings are continuous and instantaneous, and no aspirator bulb is required. The instrument case is rustproofed; parts are of anodized aluminum, and working parts are all enclosed. No pumping and diluting of gases can occur in testing. The instrument dial is calibrated for the lower explosive limit of methane gas (a 100 reading meaning an explosive mixture); however, calibrations for any other explosive gas are available.

The Probetector has the detection element surrounded by a fully enclosed flame arrestor spot welded over all turns. When an element has burned out, it will show maximum reading. The detection element is within the probe itself; hence, detection is instantaneous. Neither dirt nor water can enter the working parts of the case. The probe may be immersed in gasoline, water, or other fluids without harm.

• (*940D*) An extensive new line of "Korda" **gaskets** fabricated from "Teflon" is available from Chicago Gasket Co.

Of particular interest is the "Korda-Clad" Teflon-jacketed gasket. New features incorporated into this gasket include a seamless, one-piece, precision-machined jacket of pure Teflon assuring a perfect seal and heavier wall of Teflon on the inside diameter of the gasket giving added strength at this point of strain where the fluid handled is in contact with the gasket. Available in hard, medium and soft grades they are suitable for all metal and non-metallic flanges, and are produced in all sizes from ½" to 6" ID inclusive for ASA or special flanges.

• (*940E*) Ingersoll-Rand Co. has introduced a line of completely new **multi-stage centrifugal pumps** for applications to 1200 psi and capacities to 1600 gpm. Known as the Class HMTA, they are built in 3-, 4-, 5- and 6-inch sizes with from 3 to 9 stages.

The features of this distinctively new design are its cylindrical-bore, horizontally-split casing and compact, Unit-Type rotor assembly. The rotor assembly is composed of the shaft, impellers, and channel rings.

IN CHICAGO AND NORTHERN ILLINOIS...

Industries have Room to Grow

"The lofty oak from a small acorn grows"

Lofty oaks can't grow from little acorns without room for deep roots and spreading branches. And room to grow is as essential to industry as it is to mighty oaks.

Here in an area of 11,000 square miles, Chicago and Northern Illinois, there is a multitude of desirable plant sites all within easy access to the greatest industrial center of the United States, and yet all offer that advantage which is so essential in these days of industrial expansion—*decentralization and room to grow.*

Add to this the tremendous facilities in Chicago and Northern Illinois for transportation, marketing, research, education, culture and good living and you have a combination of industrial advantages unequalled elsewhere in the world.

Whether the requirements of your business are those of a characteristically compact industrial area or those to be found in smaller but easily accessible cities beyond, the Chicago and Northern Illinois area offers the wide diversity to include the type of space you need.

A LETTER TO US . . . describing your requirements will bring you a careful analysis of this area's advantages as they apply to your business. Or, if you wish, we will send you a carefully screened list of the available buildings or sites that would be suitable for your operations, based on the information you give us. We keep all such inquiries confidential. Just write us.

Industries in the Chicago Area have these outstanding advantages: *Railroad Center of the United States • World Airport • Inland Waterways • Geographical Center of U. S. Population • Great Financial Center • The "Great Central Market" • Food Producing and Processing Center • Leader in Iron and Steel Manufacturing • Good Labor Relations Record • More Than 2,600,000 Kilowatts of Power • Tremendous Coal Reserves • Good Government • Good Living • Good Services for Local Tax Dollars.*

TERRITORIAL INFORMATION DEPARTMENT

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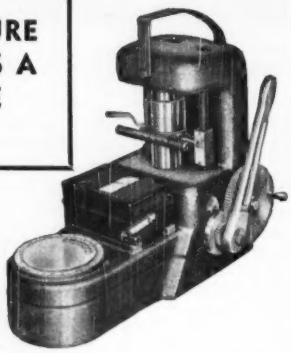
At Last!
AN ELECTRIC MOISTURE TESTER THAT COVERS A W — I — D — E RANGE



New MODEL UNIVERSAL MOISTURE TESTER

GIVES DIRECT MOISTURE PERCENTAGE READINGS INSTANTLY ON A DIAL FROM 8½ to 40%
(Lower or Higher Ranges with the Use of Charts)

This New Model Universal Moisture Tester, now being extensively used in the grain, seed and feed industries is designed for all types of material.

- It is fully portable. Requires no electrical outlets or batteries.
- Built-in thermometer automatically indicates temperature of sample. No separate temperature tests.
- Complete test made in less than a minute.
- It is consistently accurate. Gives same reading repeatedly on same sample.
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NEW EQUIPMENT——

These channel ring sections contain the multiple volutes and fluid passages, as well as the renewable wearing parts for each stage. The entire rotor assembly is quickly and easily removed from and installed in the smooth-bore casing, since there are no mating ring fits or delicate alignment problems.

• *(942A)* Fairchild Camera and Instrument Corp. is now producing a new **data recording camera** from a basic design by North American Aviation Corp. This new camera is a 35 mm. motion picture type. The unit has been subjected to exhaustive tests throughout a temperature range of from minus 60° F. to plus 160° F.; at accelerations up to 12*g*; and at altitudes ranging from 0 to 60,000 ft.

Outstanding features include remote selection of from four to sixteen frames per second, with constant exposure rate regardless of frame speed. Additional provisions are made for single frame operation, triggered either manually or by intervalometer. Integral counting circuits afford a remote means of making frame identification.

• *(942B)* An all-nickel **variable area flow meter** for handling caustic streams is now available from Fischer & Porter Co. All parts of the meter in contact with the fluid are constructed of nickel, including the precision-bore metering tube. A steam jacket surrounds the liquid passages through the meter, which is available in sizes ranging from ½ to 300 gpm. There is only one moving part, the flow-sensitive float, which is entirely confined within the liquid stream, with no bearings or seals in the system. Float movement (linear with flow rate) is picked up by means of a Magnabond magnetic follower and translated into air-pressure changes (linear with flow rate) for transmission to a receiver which can be remote from the meter.

• *(942C)* Palmetto 1330, Teflon **impregnated packing**, developed by Greene, Tweed & Co., is prepared from chemically pure blue asbestos yarn, each strand of which is thoroughly impregnated with Teflon by the same unique impregnating process employed in manufacture of all Palmetto Self-Lubricating Packings. The yarn is then braided, braid over braid—tightly, to avoid leakage through the cross section, and finished to present a Teflon protected packing built for assured high resistance to chemical attack.

Palmetto 1330 is supplied in sizes from ⅛" square up and put up on 1 lb. spools, 5½ lb. and 13 lb. boxes, or on 25, 50, and 100 lb. reels.

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TENNESSEE

Developing Industrial and Fine Chemicals through research has taught us better ways to serve customers. Research at Tennessee is not confined to our own laboratory.

When the need is indicated, where our chemicals are involved, we depend on research to solve problems for customers. Whether you buy Benzoyl Chloride or other dependable chemicals from Tennessee you get an extra benefit—technical service from practical research.

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PACKAGING & SHIPPING

by T. PAT CALLAHAN

Polyethylene Containers Good for Small Quantities of Corrosives

The corrosion resistant properties of polyethylene are being put to good use in the packaging and handling of small quantities of liquid corrosive chemicals. The General Chemical Division of the Allied Chemical and Dye Corp. recently announced that it will use a molded polyethylene jug to ship 10 pound quantities of its Baker and Adamson Technical Grade Hydrofluoric Acid. The package weighs only two pounds and is said to overcome the difficulties experienced with the heavy 17 pound lead containers that were used previously.

The new plastic jug, which will be used for the packaging of other liquid corrosives too, provides a tough, shatterproof, translucent, acid-resistant container that will not develop the dangerous leaks common to the lead containers. Because of its lightness the jug is easy to handle and hence safer to use. In addition to its utility, the jug enables the buyer to save freight on 15 pounds tare weight for each 10 pounds of acid furnished.

The new container is sealed with a screw-type polyethylene cap making opening and reclosure easy. The special design of the neck and lip insures clean accurate pouring. For convenient shipping four containers are cell packed in a standard returnable shipping case. Single containers are shipped in a wire-bound box.

In the development of this container, General Chemical draw heavily upon its experience in the use of the one pound capacity, polyethylene container it introduced four years ago for the packaging of reagent grade Hydrofluoric Acid. The one pound package features a special siphon-action pour-out which enables the chemist to dispense either drops or a needle stream as desired. The enthusiasm with which the one pound unit was greeted encouraged the company to use the light plastic material for packaging small industrial lots of their technical grade line of corrosive chemicals.

Aquet Bottle for Laboratory

Polyethylene made another recent appearance in the container field in the form of the Aquet bottle announced by Emil Greiner Co. of New York City. This new unit is a flexible, shatterproof container that can also be used as a dispenser or wash bottle for corrosive reagents. Its critically sized orifice equalizes the pressure and prevents the liquid from being forced out of the bottle when the temperature of the liquid is raised or the atmospheric pressure drops.

The bottle serves initially as a container for Aquet, a surface active agent for cleaning laboratory glassware and utensils. When empty it can then be used as a container for corrosives. Space is provided on the label to show its new contents.

Space Saver (944A)

A 20% saving in shipping and storage space results from the new "De-Aerating" method of flattening bagged clay for the rubber industry, developed recently by the J. M. Huber Corp. in its Graniteville, S. C. plant.

"De-Aerating" is a mechanical process of driving excess air out of the filled clay bags by passing them between compression roller belts. The bags emerge from this treatment flatter, more compact and easier to stack for shipment. Inventory counting is also simplified.

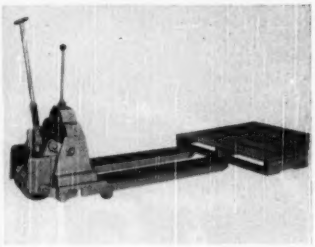
The process has the additional advantage of producing a better seal by tightly closing the bag valves. Weak bags, which burst as the pressure is applied, are readily rejected.

The characteristics of the clay products are not changed by the process. But a space saving of 12 cubic feet per ton of clay results.

New Load Lift (944B)

Aluminum alloy pallet load lift truck features retractable wheels.

A new pallet load-lift truck was recently announced by the Market Forge Co. of Everett, Mass. It is of aluminum alloy construction and features special wheels that automatically retract when the forks are in a lowered position.



The truck is supported on two front wheels and two auxiliary wheels on a very short wheel base. It can be turned easily and will lift wherever a man can stand. The rear wheels are one inch above the floor and thereby enter and leave the pallet without any interference or damage to the bottom boards. This eliminates the necessity of bevelling bottom boards or exerting extra effort in inserting or removing forks. Operating the lifting handle automatically brings the rear load wheels down to the floor and raises the auxiliary wheels.

The rear wheels are closely centered and tandem articulated and roll easily over floor obstructions, elevator inequalities and the like. The "flying handle" danger is completely eliminated because there is no connection between the pulling and the lifting handle.

Do You Want More Information?

CI has made it easy for you to learn more about any item described in this section. Simply encircle the product's identifying number on the Reader Service postcard inside the back cover.

America's Road to Victory

. . . Let's Increase Production

This is the time to speak out--now—at the beginning.

Our industrial program for re-armament is getting off on the wrong foot.

The talking and writing about it emphasize the wrong things.

Its headline words are "cuts" and "controls."

Those words make bad propaganda for the cold war.

"Cuts" and "controls" are no words to challenge the imagination and energy of our own people. They won't impress the masters of the Kremlin. And they can only make it appear to the rest of the world that America thinks it can defend the free way of life by abandoning it.

America stands as the world's champion against aggression because America has become the most powerful free nation in the world.

How did we get that way?

Not by putting ceilings on wages; not by rationing or clamping iron-clad government controls all over business and industry.

To be sure, some temporary controls are necessary to channel very scarce materials speedily to use for defense. So, too, are special taxes and credit restrictions needed to combat inflation. But they will be fatal if they blind us to this fact:

We became the strongest nation in the world by out-producing every other nation.

Production—The Final Answer

Next year our government is planning at least a $40 billion military program. Instead of planning only on controls to divert $40 billion of production from the making of civilian goods to the making of military supplies, we should be figuring out also ways to push up total production.

Of course, our industrial plant is running at close to "capacity" now. And our labor force has reached almost full employment. There isn't much slack to be taken up.

Can even the United States add a $40 billion miracle of production on top of what it is already doing?

Our answer is "Yes"—and within two years. It can be done by adding about $6 billion each year to our program of capital investment which now runs about $22 billion a year.

Part of this added production will come from expanding our industries. The steel companies, for example, already have plans to increase their capacity almost ten per cent in the next two years.

But by far the largest part of that $40 billion of added production must come from higher productivity—raising industry's efficiency.

continued on next page

To meet our goals we need to raise our productivity five per cent a year.

Can it be done?

The answer is an emphatic "Yes."

Raise Industry's Productivity

McGraw-Hill's studies of industry's equipment show that there are countless opportunities for improving efficiency. Our manufacturing industries alone need at least $35 billion of new equipment to raise their facilities to first class technical standards.

Here are some of the broad possibilities reported by the trained editors of McGraw-Hill's business magazines:

In many manufacturing plants as much as 40 per cent of workers' time goes into moving materials and parts—shifting things about within the plant between processes and to and from shipping platforms.

FACTORY estimates that improved materials handling equipment and methods might well cut handling costs twenty-five per cent and save annually over 650,000 man-years of unnecessary labor.

Modern machine tools designed since World War II are 40 per cent more productive, on the average, than is old equipment. But AMERICAN MACHINIST surveys show that 95 per cent of industry's machine tools are of designs at least ten years old. Replacing them could raise productivity of the metalworking industries at least ten per cent—enough to absorb a major share of the metalworking industries' part of the defense program as now planned.

In coal mining, latest equipment and methods can raise productivity sharply. The editors of COAL AGE estimate that production of bituminous coal could be raised from seven tons per man-shift to ten within three to five years.

Many new textile production techniques are 50 per cent to 75 per cent more efficient than those in use now. If plants could be fully modernized, and full use made of latest management methods, TEXTILE WORLD estimates that output-per-manhour would rise 20 per cent. *A FOOD INDUSTRIES study indicates that modern equipment plus the best management techniques could raise productivity in food processing at least 20 per cent.*

These are just some of the opportunities that industry can seize and by which the nation can profit.

A Nation-Wide Effort

Of course, industry itself can't do the whole job. Labor, government and all the rest of us must cooperate.

Government's part is to see that its emergency controls are so applied that they will increase productivity and thus make possible an early lifting of such controls.

Labor's part is to help in the development of labor-saving methods and machinery and to welcome their adoption as the only sure way of continuing to advance the American standard of living while maintaining the American free way of life.

For all of us the job is to work constantly for an expanding, ever-stronger America with constantly growing productivity; not a pinched and shackled America cooped up under wage and price ceilings and tied to a ration card.

Challenge to Industry

Here is a sharp challenge to industry to study the best work-methods that are being reported—to use every minute and every dollar it can to replace obsolete equipment.

Here is a sharp challenge to government to do everything within its power to make its control policies and its fiscal policies strengthen the incentives to industrial modernization—to demand sacrifice for a purpose and not for effect.

The job to which such opportunities point will take time—though nothing holds back adoption of some of the simpler improvements in work-methods reported in business magazines all the time.

But increasing production is our one best hope that we may be spared the full array of price, wage and production controls now and be freed eventually from all controls.

General Omar Bradley has said that the protection of our national independence calls for "long-range commitments that we are willing to carry out."

A long-range commitment to fight this battle for peace with America's most powerful weapon—industrial productivity—is the surest guarantee of victory for the free world.

Let's make that commitment—now—at the beginning.

McGraw-Hill Publishing Co., Inc.

for improved quality at a lower cost— try these **A. GROSS & COMPANY**

FATTY ACIDS

STEARIC ACID—Now, by combining modern scientific techniques with "know-how" that dates back to 1837, A. Gross & Company offer a HEAT STABLE Stearic Acid with a REDUCED ODOR LEVEL and increased resistance to deterioration.

This new odor-reduced "Special Improved Stearic Acid" is of importance to manufacturers of fine cosmetics, food emulsifiers, soaps, stearates and other products demanding the highest fatty acid content possible.

A. Gross' Stearic Acids follow the natural balance of Palmitic Acid and Stearic Acid as found in tallow. The importance of the Palmitic Acid content (55%) of natural Stearic Acid, whether for the production of quality face creams or durable buffing compounds, cannot be discounted.

For consumers who desire a higher percentage of Stearic Acid for less demanding applications, we have available a white Hydrogenated Tallow Fatty Acid with a Stearic Acid content of 70%.

COCONUT FATTY ACIDS—Where uniform Lauric Acid content is desired, A. Gross' Coconut Fatty Acids are your assurance of quality. Manufactured to specifications in two grades:

Regular Coconut Fatty Acids—with no fractions removed.
Special Coconut Fatty Acids—with most of the capric and caprylic fractions removed.

Of interest to manufacturers of cosmetics, shampoos, condensates, alkyd resins.

COTTONSEED FATTY ACIDS—Distilled and double distilled grades for light colored alkyd resins.

SOYA BEAN FATTY ACIDS—A quality fatty acid well accepted by the alkyd resin industry. Remarkably stable and heat resistant for light colored alkyd resins. Will pass the most rigid color requirements of alkyd resin manufacturers.

RED OIL—We've geared our production of Red Oil to meet the increased demand for low titre oleic acids. The oils contain reduced amounts of saturated acids . . . unsaponifiables are reduced to a minimum . . . titres run as low as 3°C.

A. Gross' Red Oil is especially interesting to users situated in cold climates. Particularly valuable is its easier handling feature coupled with ability to make higher soap concentrations.

WHITE OLEINE—USP—This double-distilled Oleic Acid meets USP specifications. Has pale color, low titre and reduced odor. A. Gross' White Oleine—USP is highly resistant to oxidation.

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Steel for Freight Cars Assured *(946.A)*

A program to provide sufficient steel during the first quarter of 1951 to manufacture a minimum of 10,000 freight cars per month has been authorized by the National Production Authority according to William H. Harrison, NPA Administrator. This program will also consider repair and maintenance of existing equipment.

This order, supplement No. 1 to NPA Order M-1 will provide approximately 310,000 tons of steel per month to car builders during the first three months of 1951.

ICC Regulations Changes

The following is the second and concluding section of the changes in Interstate Commerce Commission Regulations that went into effect August 29, 1950. The first half of this list appeared in the October, 1950 issue of Chemical Industries:

Note 12 to section 73.303, paragraph (q)(1) has been amended to read as follows:

Note 12: Tanks complying with specification 106A500, containing chlorine, anhydrous ammonia, sulfur dioxide, methyl chloride, dichlorodifluoromethane, monochlorodifluoromethane, monochlorotetrafluoroethane, vinyl chloride, inhibited, difluoroethane, difluoromonochloroethane, disperant gas, n.o.s., or dichlorodifluoromethane and difluoroethane mixture (*constant boiling mixture*), or tanks complying with specification 106A800, containing hydrogen, sulfide, may be transported on trucks or semitrailers only, when securely chocked or clamped thereon to prevent shifting, and provided adequate facilities are present for handling tanks where transfer in transit is necessary. See sec. 74.560(b)(2), for rail freight-motor vehicle shipments.

The above amendment provides for shipment of dichlorodifluoromethane and difluoroethane mixture (constant boiling mixture).

Table 73.303(r)(a)(1) has been amended to provide for maximum permitted filling density and specification containers required by various cargo tanks and portable tank containers of various compressed gases.

Other changes affecting 72.303 for clarification purposes have been made by the Commission and shippers who must become familiar with those detailed changes should refer to that section.

Section 73.326(a) has been amended by addition of the following note:

Note: Diluted solutions of hydrocyanic acid of not exceeding 5 per cent strength are classed a poisonous articles, class B (see sec. 73.336).

Section 73.336(a) and (b) have been cancelled and a new section 73.336 has been added as follows:

73.336 *Less dangerous poisons, class B, liquid or solid, poison label; definition.* (a) For the purpose of these regulations and except as otherwise provided herein class B poisons are substances, liquids or solids (including pastes and semi-solids), other than classes A, C, or D poisons which are known to be so toxic to man as to afford a hazard to health during transportation, or which, in the absence of adequate data on human toxicity, are presumed to be toxic to man because they fall within any one of the following categories when tested on laboratory animals:

(1) *Oral toxicity.* Those which produce death within 48 hours in half or more than half of a group of 10 or more white laboratory rats weighing 200 to 300 grams at a single dose of 50 milligrams or less per kilogram of body weight, when administered orally.

(2) *Toxicity on inhalation.* Those which produce death within 48 hours in half or more than half of a group of 10 or more white laboratory rats weighing 200 to 300 grams, when inhaled continuously for a period of one hour or less at a concentration of 2 milligrams or less per liter of vapor, mist, or dust, provided such concentration is likely to be encountered by man when the chemical product is used in any reasonable foreseeable manner.

(3) *Toxicity by skin absorption.* Those which produce death within 48 hours in half or more than half of a group of 10 or more rabbits tested at a dosage of 200 milligrams or less per kilogram body weight, when administered by continuous contact with the bare skin for 24 hours or less.

(b) The foregoing categories shall not apply if the physical characteristics or the probable hazards to humans as shown by experience indicate that the substances will not cause serious sickness or death. Neither the display of danger or warning labels pertaining to use nor the toxicity tests set forth above shall prejudice or prohibit the exemption of any substances from the provisions of these regulations.

This amendment was needed to clarify the definition for less dangerous poisons, Class B, liquid or solid.

Section 73.356 Carbolic acid (phenol), not liquid has been amended as follows:

73.356 *Carbolic acid (phenol), not liquid.* (a) Carbolic acid (phenol), not liquid, must be packed in specification containers as follows:

(1) Spec. 5, 5A, 5B, 6A, 6B, or 6C.—Metal barrels or drums.

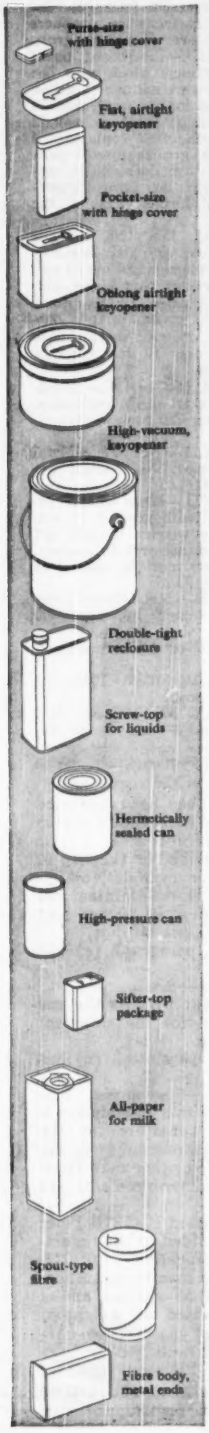
(2) Spec. 11A or 11B.—Wooden barrels or kegs with securely closed inside drums of metal not thinner than No. 26 gage, the space between drum and barrel or keg being filled with sawdust or rice hulls.

(3) Spec. 11A or 11B.—Wooden barrels or kegs with glass or earthenware inside containers, not over 1 gallon capacity each, or with metal inside containers not over 2 gallons capacity each.

(4) Spec. 12B.—Fiberboard boxes with inside containers which must be metal cans not over 25 pounds capacity each.

(5) Spec. 12B.—Fiberboard boxes with glass or earthenware inside containers not over 1 quart capacity each, or with metal inside containers not over

WHICH PACKAGE SUITS YOUR PRODUCT?



"OB-ROUND" shape means more cans pack in shipping container; more squirt per squeeze—from bellows-action sides that won't stick. Three heights (same size base): 1 oz; 3 oz; 4 oz. Full space for litho-label in many colors. Two types of closing machines available—for high-speed and for semi-automatic, limited production.

NECKS are integral part of top and are lined with synthetic rubber compound which is oil and solvent-resistant for effective sealing.

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TWO USEFUL PRINCIPLES are apparent in Canco's familiar lighter-fluid and household oil container.

The little nozzle dispenses a small amount at a time, and the screw top makes a tight reclosure for a volatile liquid.

In addition to lighter fluid

Immediately, it looks as if this container would be adaptable in some form to cologne, liquid deodorants, sun-tan lotions, cleaning fluids, polishes, rubbing alcohols, and oil and other liquid hair preparations.

How about this container for viosterol and other highly concentrated liquids requiring measurement by drops?

It's a thought to consider, and perhaps your package-development people and ourselves should talk things over.

Since 1901, Canco has been out front in creating new and more effective packages. There is hardly a major development in the packaging industry—whether it be for a food or non-food product, whether the problem is metal, or fibre, or a combination of both—that this keen, alert organization has not pioneered.

Canco can help you with eye-catching label designs, cost-cutting, sales-building advice on packages, processes, filling and closing.

Canco stands ready to serve you promptly in production-line emergencies. From Canco you get as many containers as you need when you need them. Let's get together! *Call Canco first* . . .

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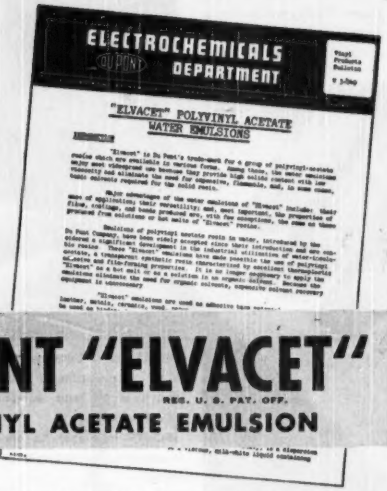

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PACKAGING & SHIPPING—

1 gallon capacity each. Packages containing glass or earthenware containers must not weigh over 65 pounds gross.

(6) Spec. 12D.—Fiberboard boxes with inside containers which must be: Glass or earthenware not over 1 gallon each; authorized for not more than 75 pounds gross weight; not to contain more than 4 such inside containers if their capacity is greater than 5 pints each. Use of this container will be permitted because of the present emergency and until further order of the Commission.

(7) Spec. 15A, 15B, 15C, 16A, or 19A. Wooden boxes with glass or earthenware inside containers not over 1 gal. capacity each, except that inside containers up to 3 gals. are authorized when only one is packed in each outside container; or with metal inside containers, not over 10 gals. capacity each.

(8) Spec. 15A, 15B, or 15C.—Wooden boxes with metal inside containers, Spec. 2F, not over 250 pounds total capacity each.

(9) Spec. 17E, 17H, or 37D.—Metal drums (single-trip). Net weight not over 475 pounds.

(10) Spec. 37G.—Metal drums securely cushioned with sawdust or rice hulls in outside wooden barrels, net weight of contents not over 250 pounds. Outside containers must be marked as prescribed in sec. 73.25.

(11) Spec. 37H.—Metal drums (single-trip). Net weight not over 200 pounds each.

(12) Spec. 42B or 42C.—Aluminum drums.

(13) Spec. 103, 103W, 103A, or 103A-W Tank cars.

(14) Spec. MC 300, MC 301, MC 302, or MC 303.—Tank motor vehicles.

Purpose of this amendment is to clarify the intent of the regulations.

Section 73.357 has been amended by the addition of paragraph (a) (12) Spec. 21B.—Fiber drums.

This is to provide for the use of this container for cyanides, or cyanide mixtures, if containing the cyanogen equivalent of 10 per cent or more of potassium cyanide.

Section 73.360, paragraph (e) has been added:

(e) Spec. 21B.—Fiber drums.

This amendment permits the use of this container for the shipment of paranitraniline.

Section 73.361, paragraph (n) has been added:

(n) Spec. 21B.—Fiber drums.

The purpose of this amendment is to provide this container for the shipment of poisonous solids as defined in section 350, other than those for which special requirements are prescribed.

A new specification ICC 21B Fiber Drum has been added to the regulations. This specification ICC 21B Fiber Drum has a maximum authorized capacity of 55 gallons and a maximum authorized net weight of 200 pounds except as otherwise covered in the regulations.

This container has been approved for certain poisons in the current amendments to the regulations.

BENZOPHENONE (diphenyl ketone) is an intriguing intermediate with an active carbonyl group connecting two phenyl groups—Its use in perfumes is well known but its potential in synthesis may still be exploited. It has been suggested as an intermediate for certain antihistaminics, hypnotics and other pharmaceuticals; insecticides; dielectric media; and as a gas absorbing medium.

$C_6H_5\ CO\ C_6H_5$

KAY-FRIES...

benzophenone

KAY-FRIES SPECIFICATIONS . . .

melting point	• 46.5°—48.5°C.
molten color	• below 100 Hazen Scale
odor	• characteristic (rose-geranium type)

• Typical reactions of BENZOPHENONE •

$RCH_2MgX + C_6H_5COC_6H_5 \xrightarrow{H_2O} (C_6H_5)_2C(OH)CH_2R +$ MgX (OH

Grignard compound → Substituted benzhydrol

$XCRHCOOC_2H_5 + H_2 + C_6H_5COC_6H_5 \xrightarrow{\text{catalyst}} (C_6H_5)_2C(OH)CRHCOOC_2H_5 + HX$

Subst. haloacid ester → ethyl 3-hydroxy-3, 3-diphenyl-2-subst. propionate

$H_2 + C_6H_5COC_6H_5 \xrightarrow{\text{catalyst}} (C_6H_5)_2CHOH$ benzhydrol

In the reduction, other products may be obtained by varying the conditions.

H_2O_2 hydrogen peroxide $+ C_6H_5COC_6H_5 \longrightarrow C_6H_5COOC_6H_5 + H_2O$ phenyl benzoate

$CO_2 + H_2 + C_6H_5COC_6H_5 \xrightarrow{Na} (C_6H_5)_2C(OH)COOH$ benzilic acid

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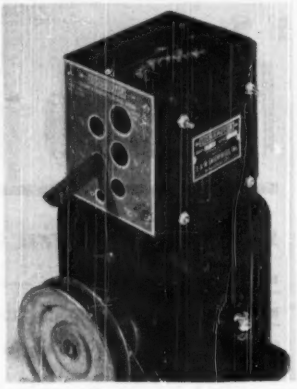
Pump (950A)

No contamination or corrosion are advantages of a new inexpensive pumping unit.

A new pumping unit provides continuous liquid flow by means of a series of fingers that exert pressure on flexible tubing. Contamination from metal parts and corrosive effects are eliminated, since the liquid flows only through the rubber or synthetic tubing and does



not come in contact with any mechanical parts.

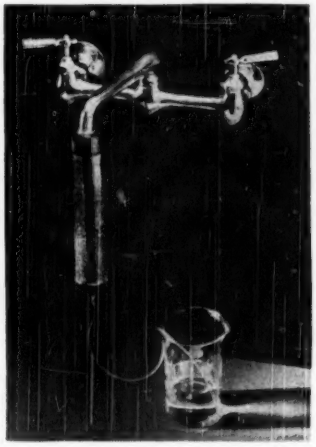
Designed to pump liquids or gases, it can accommodate solids in solution and will handle from 1½ to 30 gallons per hour without speed changes. Easily installed in any system with commercial fittings, and quickly changed from one fluid to another the machine can handle a number of different fluids at the same time, entirely independent of each other. Proportional and very small flows are other features.

The machine, known as the Sigmamotor, is manufactured by E. & M. Enterprises, Inc.

• *(950B)* **Designed for glassblowers,** new goggles have special didymium filtering lenses which absorb the objectionable yellow glare present in glassblowing operations. Only a trace of yellow light is transmitted yet the intensity of red and other colors in the visible spectrum is not seriously reduced; permitting the glassblower to see the flame and the outline of incandescent glass unobscured by the yellow sodium glare. Securely mounted in non-corrosive frames, the lenses can be worn safely and comfortably near sources of intense radiation for long periods. Available from Parr Instrument Co.

• *(950C)* **Dual cone laboratory fractionator** specifically designed to work out fractionating problems on a pilot scale will handle practically any finely ground chemical, pharmaceutical, or ceramic material, regardless of particle size. A skilled operator is not required as the sample is simply delivered to the feed hopper at the front of the unit, and a centrally located switch controls the blower within the cabinet. The unit may be adapted to materials of any specific gravity by a graduated pressure valve on the primary air intake. The coarse fraction discharges directly out the bottom of the Fractionator, while fines are carried over to the collector for recovery. The unit is obtainable from the Prater Pulverizer Co., Chicago.

Ion Exchanger (950D)



A new and refillable ion exchange unit for small quantity uses delivers water equal to triple-distilled in chemical quality. Called the Filtr-Ion, it is a product of La Motte Chemical Products Co., Baltimore 4, Md.

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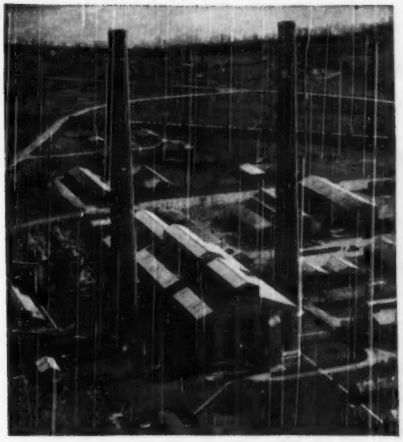
SULPHUR

*Interesting Facts Concerning This Basic Raw Material from the Gulf Coast Region

*MINING



The process of mining sulphur, as developed by Herman Frasch, takes advantage of the fairly low melting point of sulphur (about 240° Fahrenheit). The process resolves itself into three parts: one, operating a power plant that heats and pumps to the field large quantities of water; two, distributing the hot water through wells to melt the underground sulphur, and raising the melted sulphur to the surface; three, cooling and solidifying the sulphur in large vats from which it is broken and loaded into cars for shipment.

The power plant and water reservoir, as well as the vats and permanent structures, are placed at some distance from the sulphur deposit to avoid possibility of damage from surface subsidence, resulting from extraction of the underground sulphur.

Loading operations at one of the huge vats of Sulphur at our Newgulf, Texas mine. Such mountains of Sulphur are constantly being built at our mines, from which shipments are continually made.

TEXAS GULF SULPHUR CO. INC.

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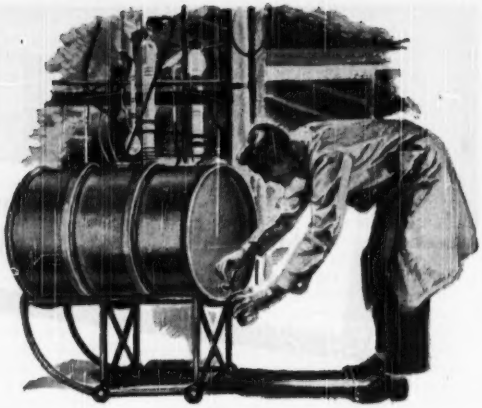
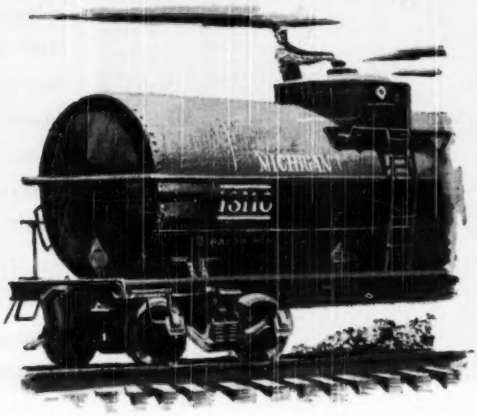
Mines: Newgulf and Moss Bluff, Texas

Now you can buy in nickel drums Wyandotte's Commercial Mercury Cell Caustic for pilot plant use





If you've got a mini-lab or pilot plant you probably know a lot about the growing pains of switching a process to a commercial scale. For instance, if you were using a reagent grade caustic in your pilot plant you'd probably run into difficulty matching it with a commercial product on a full production scale.

And that's where Wyandotte Chemicals can help you. Wyandotte Mercury Cell Caustic Soda is purer, as is, than most laboratory reagent grades. It is shipped to our customers in specially lined tank cars to prevent "iron pick-up" . . . and meets the most exacting specifications. For instance, it satisfies the high-quality requirements of the rayon industry.

Now for the first time you can buy this same Wyandotte Mercury Cell Caustic in nickel drums. You can use it in your mini-lab or pilot plant safe in the knowledge that the form and composition will be identical when you buy it on a commercial scale. The nickel drums eliminate "iron pick-up" . . . assure you a consistent product. Why not write us today?

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Equipment

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Booklet devoted to chemical and clinical centrifuges describing features and related equipment. E. Machlett and Son.

Cryostat . . . . . (953Z)

Booklet describing a helium cryostat used in laboratories to provide temperatures from room temperature down to several degrees above absolute zero. Arthur D. Little, Inc.

Radioactive Measurement . . . . (953AA)

Information bulletin 10 gives details on instruments and accessories for measurement of radioactivity. The bulletin illustrates equipment of this nature contained in a complete basic radiochemical laboratory. Radiation Counter Laboratories, Inc.

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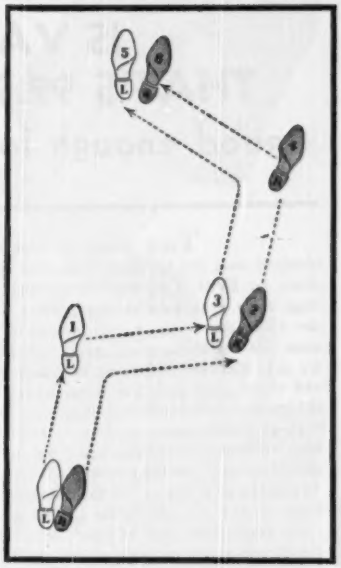
of these booklets and bulletins are easy to obtain. Simply encircle the proper number on the Reader Service postcard inside the back cover. A few publications are marked with asterisks, and these you must request from the firms involved on your own company letterhead.



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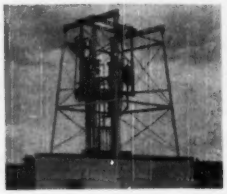

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BOOKLETS AND BULLETINS—

Dry Type Transformers .....(954A)

23-p. booklet B-4428 states reasons why dry-type transformers are safer and less expensive for operation in plants, mines, etc. Different types are illustrated. Westinghouse Electric Corp.

Thermocouple Manual .....(954B)

New 42-p. edition of a manual containing prices, application recommendations and pertinent information on resistance bulbs and wells, radiation detectors, thermocouples and other accessories for indicating, controlling and recording instruments. Wheelco Instruments Co.

Fiberglas* ....(954C)

Third edition of a bibliography of annotated references to selected articles which have appeared in the nation's press concerning Fiberglas products. Owens-Corning Fiberglas Corp.

Drum Hoist ....(954D)

16-p. bulletin covers single drum, multi-purpose hoists for industrial plants. Descriptions and specifications for hoists with capacities from 500 to 3500 pounds are given with a chart to simplify the selection of a hoist for a particular operation. Joy Manufacturing Co.

Filters .....(954E)

4-p. booklet describes filters for plating solutions. Filters have new slurry tank design and recently developed lucite filter plates. Filters for both acid and cyanide solutions are considered. Belke Manufacturing Co.

Lubricants ....(954F)

Folder covers line of greases for anti-friction bearings. Facts on use, application, maintenance and selection for 25 different densities are included. Master Lubricants Co.

Materials Handling .....(954G)

Condensed catalog containing basic specifications of the firm's entire line of materials handling equipment. Clark Equipment Co.

Laboratory Apparatus .....(954H)

Catalog 450; a handbook listing over 25,000 items of laboratory chemicals and equipment. Burrell Corp.

Mill ....(954 I)

12-p. bulletin describes the operation, design features and performance data of Tricone mill. Hardinge Co., Inc.

Photometer .....(954J)

Bulletin 360 describing new line-operated multiplier photometer of high sensitivity which permits the measurement of light value far below the previously measurable level.

Dust Control .....(954K)

8-p. bulletin No. 282 describes the operation of cloth tube collectors employed in recovering values in gases from roasters, sintering machines, induction furnaces, etc. American Wheelabrator and Equipment Corp.

Conveyors .....(954L)

Folder illustrates industrial installations utilizing sealed pin, synthetic rubber flight conveyors. Hapman Conveyors, Inc.

Electrical Distribution .....(954M)

64-p. catalog No. 25 describing prefabricated trolley busway electrical distribution system. Aids in the selection of equipment for electrical installations in process applications. Feedrail Corp.

Heat Exchangers ....(954N)

Bulletin noting features and specifications of heat exchangers for oil cooling diesel and gasoline engines. Young Radiator Co.

Steam Traps .....(954 O)

4-page booklet contains specifications, capacities, sizes, pressures, weights and prices of steam traps. V. D. Anderson Co.

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NEWS OF THE MONTH

New Construction

• **Contracts have been issued** by National Lead Co. to Chemical Construction Co. for two new sulfuric acid plants, one in St. Louis and the other in Sayreville, N. J. Both will have capacities in excess of 300 tons per day. Output will be used to expand the company's titanium pigment facilities.

• **Victor Chemical Works** has entered into a loan agreement with The Equitable Life Assurance Society providing for loans aggregating $6,000,000 to be used principally for the expansion of production facilities, including construction of a new elemental phosphorous plant at Silver Bow, Montana.

• **First plant to go up** on the 225-acre site 10 miles north of the Memphis, Tenn., business district that Du Pont bought last May will be a $7.5 million sodium cyanide unit. Construction is expected to start this winter, take a year to complete. It will be operated by the Electrochemicals Department.

The new plant will be of modern, open-air construction. Water and air pollution problems are being met in the design stage, as the installation will have complete waste control equipment.

There are plans for other units on the site to manufacture related chemical products.

• **Additions amounting to approximately $1,175,000** are planned by Heyden Chemical Corp. for its Garfield, N. J., plant. The principal new facilities will be a power plant unit and new manufacturing units for production of pentaerythritol. The installations are scheduled for completion during the last quarter of 1951.

• **A new battery of 30 coke ovens,** costing about $2 million, will be installed by Sloss-Sheffield Steel and Iron Co. at its Birmingham, Ala., plant. The ovens will raise the firm's capacity from 2,770 to 3,280 net tons per day. Koppers Co. has been awarded the construction contract.

• **Increased Styron production** is promised by Dow Chemical Co. Construction has been started on a new plant at an 80-acre site near New London, Conn., and on an addition to the plastics building at Midland, Mich. The New London plant is located on the Thames River and Dow plans to ship some raw materials directly from its Texas Division via water route. It is expected that the plant will be completed in about a year. Facilities at Midland are designed for manufacture of Styron 470, high-impact, high-strength plastic used for molding of refrigerator parts, and Styron 671, high heat resistant copolymer used for housewares and radio cabinets.

Edward W. Rugeley, appointed technical director of the Textile Fibers Department, Carbide and Carbon Chemicals Division, Union Carbide and Carbon Corp., at South Charleston, W. Va. He was formerly superintendent of the Research and Development Division at South Charleston.

• **A new source of supply for fertilizer** and industrial ammonia has been opened by Spencer Chemical Co. at Henderson, Ky. Rated annual capacity is 68,000 tons of ammonia.

Spencer purchased the Henderson plant from the government last May 1, at the same time leasing nitric acid facilities at Charlestown, Ind. A rehabilitation program, representing an estimated investment of $3 million was immediately started at both plants.

The Charlestown Works will be used to manufacture Spensol (ammoniating solutions) for mixed fertilizers from ammonia made at Henderson. Operations are expected to begin during the first week in December.

• **Mississippi's first pine gum** cleaning and distilling plant has begun operations in Wiggins, using processes developed by the U. S. Department of Agriculture at a field station of the Bureau of Agricultural and Industrial Chemistry, Olustee, Fla.

The processes include an improved procedure for cleaning crude pine gum to produce clean, brilliant rosin, and the use of steam distillation to obtain bright turpentine.

• **New chlorine and caustic soda facilities** have been completed at Hooker Electrochemical Co.'s Tacoma, Wash., plant. These include two circuits of Type S-3 electrolytic cells, additions for treating and handling brine, and triple effect pans for caustic evaporation. Hooker plans additional production of chlorine and caustic largely to meet increasing requirements of pulp mills in the Pacific Northwest.

• **Enlarged facilities** for the production of incendiary weapons are being built at the Army's Rocky Mountain Arsenal, Denver, Col. Contract for design and construction has been awarded the Kellex Corp., New York.

• **A laboratory for research and development work** on phosphates has been started by Westvaco Chemical Division, Food Machinery and Chemical Corp. at its Carteret, N. J., plant. It is scheduled for completion in February.

• **A new $10,000 rubber research laboratory** has been established at Armour Research Foundation of Illinois Institute of Technology. Specific projects now in progress include custom compounding of rubber stocks for specialized uses and a basic study of new types of petroleum oils and resins in the compounding of rubbers.

A 200-ton hydraulic press, a rubber mill, and other pieces of heavy equipment were donated jointly by the Foundation and the White Cap Co. of Chicago. Various pieces of testing equipment were donated by the Precision Scientific Co., also of Chicago.

• **The General Electric Co.** has opened its new measurements laboratory at Lynn, Mass. The new lab contains complete facilities for applied research product development and design in the field of measurements.

Washington

• **The Emergency Procurement Service,** General Service Administration, is planning to procure water treatment chemicals in the United States and possessions for immediate delivery to Korea. Interested suppliers should write the Emergency Procurement Service, General Services Administration, 7th and D Sts., S.W., Washington 25, D. C., for full details, specifications and

instructions on how to submit offers.

• **The Department of the Army** has partially reactivated these nine Ordnance plants: Elwood Ordnance Plant, Joliet, Illinois; Kansas Ordnance Plant, Parsons, Kansas; Lone Star Ordnance Plant, Texarkana, Texas; Louisiana Ordnance Plant, Shreveport, Louisiana; Nebraska Ordnance Plant, Wahoo, Nebraska; Ordnance Assembly Plant, Edgewood, Maryland; Radford Ordnance Works, Radford, Virginia; Ravenna Ordnance Plant, Apco, Ohio, and Wolf Creek Ordnance Plant, Milan, Tennessee.

• **Army Quartermaster Specifications,** which have previously been available only from the agency calling for bids, can now be supplied by any of three sources: Quartermaster Procurement Agency, 111 East 16th St., New York 3, N. Y.; Chicago Quartermaster Depot, 1819 West Pershing Road, Chicago 9, Ill., and Oakland Quartermaster Procurement Agency, Oakland Army Base, Oakland 3, Cal.

General

• **A new law** "defining and regulating the practice of the profession of engineering and creating a Board of Registration for Professional Engineers in the District of Columbia" has been passed by Congress. Engineers are required to register in order to practice in any of the 48 states, and it is anticipated that those registered will be granted privileges in the District under reciprocity rules.

• **The Department of Industrial Engineering,** Columbia University, will conduct its Second Annual Conference on Industrial Research during the week of June 11-15, 1951.

The 1950 conference was chiefly concerned with the administration of costs and budgeting. In 1951, the emphasis will be on the selection, training, and administration of research personnel.

• **Among papers to be presented** at the Third World Petroleum Congress are 30 on the production of chemicals from petroleum, their properties and applications. The Congress will be held at The Hague, Holland, from May 28 to June 6.

• **The American Society for Testing Materials** has approved many new specifications and test methods and made revisions in a great many existing standards. Among the subjects covered by the new standards are steel, magnesium oxychloride compounds, soils, simulated ocean water, and chemical analysis of metals. The October issue of the ASTM Bulletin carries an article on the revisions.

Ownership Changes

• **Olin Industries, Inc.,** has purchased a substantial interest in the Harwid Co., Cambridge, Mass., a leading manufacturer of polyethylene film. There will be no change in the present Harwid management or sales distribution.

Olin's interest in polyethylene film will complement its sale of cellophane. Olin's plant for the production of cellophane is now being constructed at the Ecusta Paper Corp., subsidiary of Olin Industries, at Pisgah Forest, North Carolina.

• **Vegetable Oil Products Co., Inc.,** Wilmington, has purchased the plant and facilities of W. C. Hardesty Co., Inc., at Los Angeles. The plant will operate as the Vopcolene Division of Vegetable Oil Products.

Manager in charge of the plant will be W. J. O'Connell, who headed the operation under the Hardesty administration. No major changes in production are anticipated. Fatty acids and industrial oils produced in the plant will be marketed under the Vopcolene trade name.

Foreign Developments

• **Dominion Tar and Chemical Co.** plans immediate construction of an ethylene glycol and ethylene oxide plant in Montreal East. The company also intends to expand its phthalic anhydride facilities substantially. The total cost of these expansions will be more than $5 million.

• **The phenol factory** of the Netherlands State Coal Mines at Lutterade (Province of Limburg) is nearing completion. The entire output, according to reports, is destined for the new Enkalon and Akulon factory of the Aku concern. Although it had been stated that Enkalon and Akulon would be based on the DuPont nylon patents purchased by Aku, it appears that these new Aku products will be of a different character, and generally speaking, an improvement on the nylon product. The phenol will be produced by the State Coal Mines from benzol in an entirely new process invented in the mines' laboratories.

• **American Cyanamid Co.** has obtained substantial restoration of power to the Niagara Falls, Ontario, plant of its subsidiary, North Amer-

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ican Cyanamid, Ltd. Production of calcium cyanamide at the plant is rapidly approaching normal and it is hoped that supplies of derivatives from cyanimide will increase.

• **A new $224,000 crushing plant** at Northgate, Australia, has been opened by the Queensland Agriculture Minister. At the opening of the plant, V. G. Watson, of Meggitt, Ltd., said that since 1911, when the Commonwealth imported the whole of its linseed requirements, processing factories have been established in New South Wales, Victoria, South Australia and now Queensland. Queensland is proving suitable for growing linseed, and from the first acreage of 1,800 acres sown in 1947, this year's area under linseed was 50,000 acres.

Company Notes

• **Albert E. Marshall,** recently vice president in charge of the Rumford Division, Heyden Chemical Corp., and president of Rumford Chemical Works prior to its purchase by Heyden, has opened an office in the Industrial Trust Bldg., Providence, R. I., and resumed practice as a consulting chemical engineer. Heyden recently was bought by Hulman & Co., Terre Haute, Ind., from Heyden. Mr. Marshall is a past president of the American Institute of Chemical Engineers.

• An Organic Synthesis Group to synthesize compounds not generally available through commercial supply houses has been established by Atlantic Research Corp., research and development firm with laboratories in Alexandria, Virginia.

Present projects of this group of specialists range from compounds needed in industry to those required for medical research and pharmaceutical testing programs, and include synthesis of compounds not reported in the chemical literature.

• **International Minerals and Chemical Co.** is considering new financing to increase the company's working capital. Among several projects which may be undertaken, are further expansion of mining operations, expansion of the chemical plant now being built in Florida, and other plant expansions for the production of fine chemicals for the pharmaceutical trade.

John S. Coey (left), named Eastern sales manager, Hooker Electrochemical Co., and F. S. Swackhamer, appointed manager of the Eastern Division sales development department, Shell Chemical Corp. Mr. Coey has been with Hooker since 1937. Mr. Swackhamer was assistant manager of Shell's Eastern Division.

• **The Gamma Chemical Corp.** has purchased a new plant at Great Meadows, N. J., which covers 80 acres and has buildings with an aggregate floor space of over 30,000 square feet.

These new facilities will give the company an enlarged capacity for the production of oxyquinoline compounds and other fine organics.

• **Roger Williams, Inc.,** chemical consultants, has moved to 148 East 38th St., New York City.

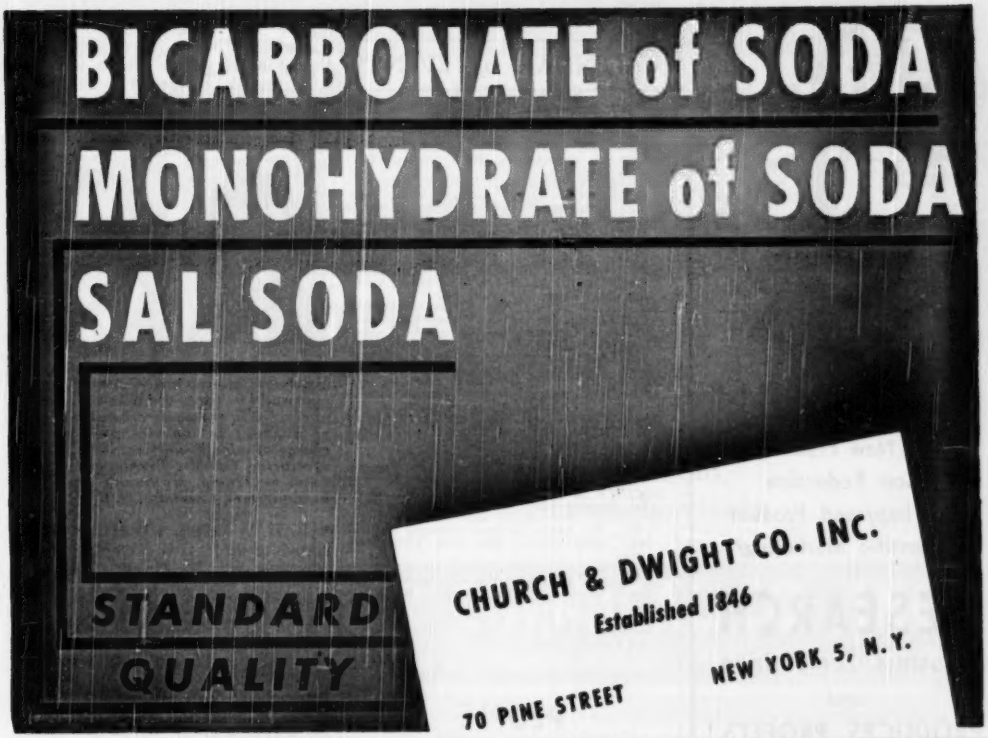
• **Chemical companies report** the following sales and earnings on past operations:

Company	Sales for Nine Months Ending September 1949	Sales for Nine Months Ending September 1950	Net Income for Nine Months Ending September 1949	Net Income for Nine Months Ending September 1950
Air Reduction Co., Inc.	$ 68,849,182	$ 71,601,562	$ 4,901,597	$ 6,477,133
Allied Chem. & Dye Corp.	274,224,611	291,889,740	.....	28,641,033
Atlas Powder Co.	.....	29,925,364	.....	2,034,820
Celanese Corp. of Amer.	.....	.....	10,988,870	32,994,645
Comm. Solvents Corp.	24,741,618	28,775,498	2,483,278	2,823,131
Dewey & Almy Chem. Co.	12,183,853	15,482,804	556,160	1,421,433
E. I. duPont de Nemours & Co.	761,532,885*	927,562,749	98,190,291*	149,335,126
Freeport Sulphur Co.	.....	.....	4,016,121	4,735,414
Hercules Powder Co.	89,659,952	113,906,310	.....	.....
Lion Oil Company	47,726,437	60,398,785	6,422,441	10,414,876
Mathieson Chem. Corp.	11,687,720**	14,767,980	5,190,700**	6,496,551
Monsanto Chem. Co.	.....	163,271,934	11,555,833	20,762,781
Penn. Salt Mfg. Co.	25,087,796	29,617,541	2,108,258	3,136,601
Sterling Drug, Inc.	100,849,498	103,436,334	11,090,772	11,213,202
Victor Chemical Works	.....	.....	1,982,552	3,078,617

* Does not include General Motors & Subsidiaries.

** Does not include first quarter earnings of Standard Wholesale Phosphate and Acid Works, Inc., and Southern Acid, Sulphur Co., Inc., acquired April 1, 1949.

	Sales for Three Months Ending September 1949	Sales for Three Months Ending September 1950	Net Income for Three Months Ending September 1949	Net Income for Three Months Ending September 1950
Davison Chemical Corp.	$ 6,606,000	$ 7,487,000	$ 296,000	$ 305,000
International Minerals and Chemical Corp.	10,208,702	11,500,292	805,627	943,366
McKesson and Robbins	87,944,222	105,377,299	1,791,501	2,100,828
Texas Gulf Sulphur Co.	.....	.....	.....	6,387,378



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CALENDAR *of* EVENTS

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE, annual meeting, Cleveland, O., Dec. 26-30.

AMERICAN CHEMICAL SOCIETY, symposium on radioisotopes, Hotel Statler, New York City, Jan. 19.

AMERICAN DRUG MANUFACTURERS ASSOCIATION, annual meeting, White Sulphur Springs, W. Va., Apr. 30-May 3.

AMERICAN INSTITUTE OF CHEMICAL ENGINEERS, regional meeting, The Greenbrier, White Sulphur Springs, Va., Mar. 11-14.

AMERICAN PHARMACEUTICAL MANUFACTURERS ASSOCIATION, annual meeting, Boca Raton, Fla., Apr. 2-4.

AMERICAN SOCIETY FOR QUALITY CONTROL, 5th annual convention, Hotel Cleveland, Cleveland, O., May 23-24.

AMERICAN SOCIETY FOR TESTING MATERIALS, spring meeting and committee week, Cincinnati, O., Mar. 5-9.

AMERICAN WOOD-PRESERVERS' ASSOCIATION, annual meeting, Stevens Hotel, Chicago, Ill., Apr. 24-26.

DRUG, CHEMICAL AND ALLIED TRADES SECTION, 25th annual dinner, The Waldorf-Astoria, New York City, Mar. 8.

MATERIALS HANDLING INSTITUTE, exposition and conference, International Amphitheatre, Chicago, Ill., Apr. 30-May 4.

SOCIETY OF COSMETIC CHEMISTS, meeting, Biltmore Hotel, New York City, Dec. 5.

SOCIETY OF PLASTICS ENGINEERS, INC., 7th annual national technical conference, Hotel Statler, New York City, Jan. 18-20.

SOCIETY OF THE PLASTICS INDUSTRY, 6th annual technical session, Edgewater Beach Hotel, Chicago, Ill., Feb. 28, Mar. 1, 2.

SOCIETY OF THE PLASTICS INDUSTRY (CANADA), INC., Canadian SPI annual meeting, Mount Royal Hotel, Montreal, Quebec, Canada, Mar. 5-6.

PEOPLE

• Marion W. Boyer has accepted the post of general manager of the **United States Atomic Energy Commission.** He goes to the Commission staff from the senior executive group of the Esso Standard Oil Company where he has been vice president in charge of manufacturing.

• William C. Dearing, former director of research for the Plaskon Division of Libby-Owens-Ford Glass Co., has joined the Research Department of **Koppers Co., Inc.** He has been named assistant manager of the Koppers Research Department Laboratory Section, and will work with Gilbert Thiessen, who recently was named manager of that Section.

• **Celanese Corp. of America** has named Emery N. Cleaves vice president in charge of public relations; Edward R. Allan vice president in charge of labor relations; and H. E. Martin vice president in charge of the cellulose acetate division.

• William Naden has been elected a vice president and Herbert P. Schoeck a director of **Esso Standard Oil Co.**

Mr. Naden, who joined the company more than 20 years ago as a chemist at the Everett, Massachusetts, Refinery, has been a director and general manager of manufacturing. Mr. Schoeck started with Esso 33 years ago as an office boy.

Dwight L. Turner (left), appointed Southern Sales manager, Arnold, Hoffman and Co., Inc.; and Albert H. Clem, appointed to the newly created position of assistant to the vice president in charge of sales, Pennsylvania Salt Manufacturing Co. Mr. Turner will be located at Arnold, Hoffman's Southern headquarters, Charlotte, N. C.

• B. H. Wojcik has been appointed associate director of petro-chemical research at **Mathieson Chemical Corp.** He was with Hooker Electrochemical Co. prior to his Mathieson appointment.

• Virgil C. Williams has been appointed associate director of **General Aniline & Film Corp.'s** Central Research Laboratory at Easton, Pa. He will also be in charge of Chemical Engineering development. He was formerly Head of the Chemical Engineering Department at Northwestern University.

• Ernst Ohlsson has resigned as chief chemist and production manager of **Van Dyk & Co., Inc.,** Belleville, N. J. He was associated with the company, of which he was also director, vice president, and secretary, since 1915. He has not yet announced his future plans.

• Nicol H. Smith has been appointed executive director of **The Franklin Institute** laboratories for research and development.

• **The Dow Chemical Co.** has appointed Leland A. Doan as Western sales manager. In 1945 he became manager of the Los Angeles office which position he held until early this year when he was promoted to assistant sales manager.

• Charles M. Holmes, assistant manager of the **Quaker Oats Co.'s** Memphis, Tennessee, chemical plant, has been named manager of Quaker's chemical plant to be built in Omaha, Nebraska.

• **Chas. Pfizer & Co., Inc.,** Brooklyn, N. Y., has appointed Charles A. Kapp Western district manager of its Antibiotic Division. He will make his headquarters in San Francisco.

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CHEMICAL MARKETS

Producers' Sulfur Stocks Resume Decline

After scoring slight increases in June and July, producers' sulfur stocks have resumed their long-continued decline, dropping from 2,975,927 long tons at the end of July to 2,935,503 long tons at the end of August and 2,835,688 long tons at the end of September. This is only slightly over a five-months supply above ground at the September rate of consumption, 528,060 long tons.

No German Chemicals Available for Export

German chemical production has continued to expand during recent months but, as yet, it is insufficient for domestic requirements. Shortages have been reported for some fields, e.g., products based on aldehydes. Demand is heavy for hydrochloric acid, sulfuric acid and chlorine while supplies of sodium carbonate, caustic soda and casein are insufficient for domestic needs. Of particular interest is the report that benzol is similarly short, although production has been 22-23,000 tons per month for some time past.

Domestic production of antibiotics is regarded as sufficient, but there seems to still be a good market for the imported materials, particularly British- and Swiss-produced materials.

Potash Deliveries Up

The five major American potash producers delivered 560,672 tons of potash salts containing an equivalent of 323,265 tons K_2O during the third quarter of 1950, an increase of 12% in salts and an increase of 17% in K_2O over the same period in 1949, according to the American Potash Institute.

Agricultural deliveries in the United States, Canada, Cuba, Puerto Rico, and Hawaii amounted to 524,154 tons of salts, equivalent to 300,907 tons K_2O, comprised of 461,041 tons of muriate of potash, 3,818 tons of manure salts, and 59,295 tons sulphate of potash and sulphate of potash-magnesia. The chemical industry took 29,458 tons of muriate of potash and sulphate of potash, containing an equivalent of 18,161 tons of K_2O. Other exports amounted to 7,060 tons of salts containing 4,197 tons K_2O.

During the first nine months of 1950, total deliveries by United States producers and importers amounted to 1,676,410 tons of potash salts containing 956,521 tons K_2O, an increase of 1% in salts and 7% in K_2O over the corresponding period in 1949. Potash for agricultural use in the United States, Canada, Cuba, Puerto Rico, and Hawaii amounted to 885,829 tons K_2O contained in 1,561,545 tons of salts of which 1,349,766 tons were muriate of potash, 14,929 tons manure salts, and 196,850 tons sulphate of potash and sulphate of potash-magnesia, representing a decrease of 1% in salts and an increase of 6% in K_2O. Deliveries to the chemical industry totaled 92,336 tons of muriate of potash and sulphate of potash, containing an equivalent of 57,195 tons K_2O, an increase of 17% in salts and 18% in K_2O as compared to 1949. Other exports amounted to 22,529 tons of salts, containing an equivalent of 13,497 tons K_2O, an increase of 60% in salts and 58% in K_2O over the same period in 1949.

Inorganic Chemical Production Steady

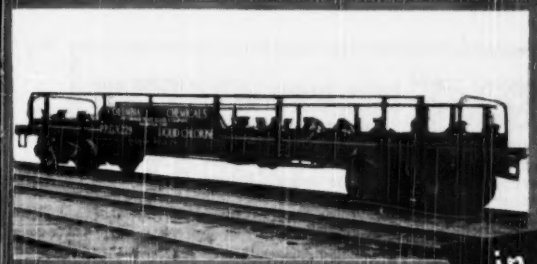
August output of the "heavy volume" inorganic chemicals was generally about the same as for the preceding month, whereas gains over the preceding month's volume were reported for other industrially important inorganic chemicals, according to the Bureau of Census. In comparison with August 1949 figures, 24 chemicals were produced in larger volume while production declines were reported for 8, including the strike-ridden soda ash and sodium bicarbonate industry.

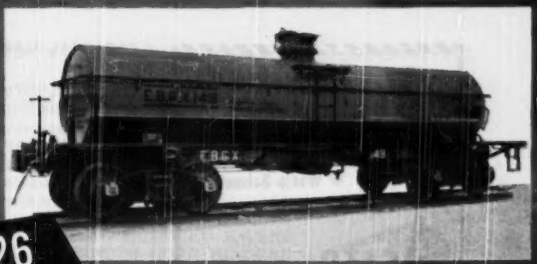
All-time production highs were reported in August for hydrogen, chrome yellow and orange, and

POTASH DELIVERIES IN NORTH AMERICA
(Short Tons K_2O)

	Jan.-Sept. 1950	*Jan.-Sept. 1949*	*July-Sept. 1950*	*July-Sept. 1949*
Muriate	808,842	742,599	278,350	232,813
Manure Salts	3,750	42,353	962	8,926
Sulphate and Sul. Pot. Mag.	73,237	52,864	21,595	17,057
Total Agricultural	885,829	837,816	300,907	258,796
Chemical	57,195	48,630	18,161	14,981
Other Exports	13,497	8,536	4,197	2,434
Grand Total	956,521	894,982	323,265	276,211

In 1926 chlorine was shipped either in small container cars or 15-ton tank cars.





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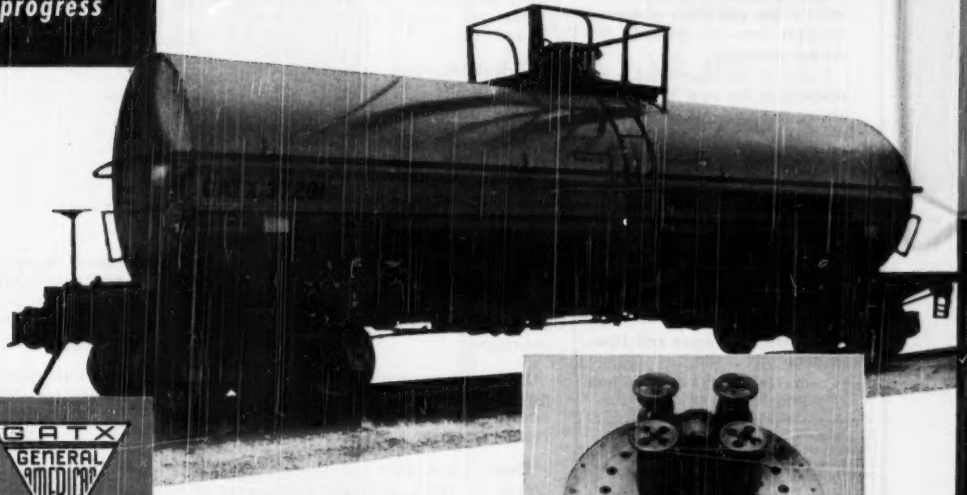

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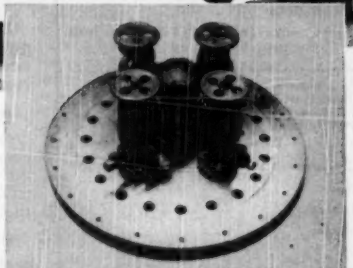

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☐ **Agitators for Liquids:** by Julian C. Smith, March 1949.
☐ **Centrifuges** by Julian C. Smith, September 1949.
☐ **Chemical Filters** by Shelby A. Miller, January 1950.
☐ **Mixers for Pastes and Powders** by Julian C. Smith, June 1950.

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molybdate chrome orange. In addition sizable gains over last month's production were reported for calcium phosphates, sodium sulfates, chrome green and oxygen. Seasonal declines, however, were reported for ammonium nitrate, ammonium sulfate and calcium arsenate.

Rubber Use Drops

Consumption of new rubber during September declined 3.79% to 109,122 long tons from the August record of 113,421 tons, according to the monthly estimate of the Rubber Manufacturers Association, Inc.

Use of natural rubber during September declined 5.61% to 60,269 long tons, against 63,852 tons in August.

Synthetic rubber used during the month amounted to 48,853 long tons, 1.45% lower than the 49,569 tons used the month before.

For the first nine months of 1950, the rubber manufacturing industry used 926,677 long tons. This is over 25% higher than the comparable tonnage used in the same period of 1949, 737,806 tons. Of the total used to date in 1950, 548,014 tons were natural rubber and 378,663 tons were synthetic.

Consumption of reclaimed rubber rose in September to 27,684 long tons, an increase of 7.27% over the 25,807 tons used in August.

Market Review

Settlement of the five-month strike at the plant of a major coal tar refiner should relieve the extreme shortage of naphthalene and of tar acids and bases. Concomitantly, this will soon begin to alleviate the similar shortages on such naphthalene-derived products as phthalic anhydride and beta-naphthol.

Demand for oxalic acid has been running at such a high level that the ample supply position of a few months ago has been replaced by a condition where producers are booked nearly solid until the first of the year. At the same time prices have advanced 1-2¢ per pound to 15½¢ per pound in ten thousand pound lots.

Trichlorethylene resale market prices of 20¢ per pound reflect the current short supply. Carbon tetrachloride is in a similar short position and commands 16-17¢ per pound in the resale market.

Attempts by U. S. consumers to rebuild their depleted caustic soda inventories is slowing up the reentry of U. S. producers into the export markets. British supplies have moved in to cover the gap but meeting their commitments has been difficult because of steel drum shortages.

Increased quantities of propylene glycol are moving into pharmaceutical uses to replace the now more costly glycerine.

Heavy metal salts continue to increase in price, reflecting the increased prices of the metal markets. Silver, copper and lead salts were among those which scored advances this month.

The price of crude glycerin has eased somewhat, apparently due to industry fears that a runaway market is a proper invitation to the establishment of price controls. The amount of glycerin which is being imported for direct sale has dropped essentially to zero with most of the present incoming stocks coming in on old contracts.

Demand for aniline has been sustained for some time. In meeting this, producers have had to operate with both higher-priced and short chlorine and benzene, making it impossible to make much progress against the large backlog of orders that exists. So far the price increases in benzene and chlorine have been absorbed by the manufacturer.

Phenol has been in a state of continual scarcity for the same reasons cited for aniline inasmuch as most phenol is also produced from benzene with the help of chlorine. The recent price increase on sulfur and concomitantly for sulfuric acid has added a similar pressure for a price increase on synthetic phenol produced by means of the sulfonation process.

The sustained heavy overall demand for phthalic anhydride is of such magnitude that the market is maintaining a price spread of as much as 3¢ per pound.

The ethyl alcohol market can still best be described as confusion with different prices being quoted by different producers and with a demand which is much in excess of supply. However, as soon as the problems of obtaining alcohol to operate the alcohol-based butadiene plants has been ironed out, the two-price system of World War II will probably reappear. One price will be for the synthetic materials and another highly variable price for the fermentation alcohol.

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NEW U. S. PATENTS

A complete digest of recently issued patents of special interest to the chemical process industries, conveniently categorized by major fields.

Printed copies of patents are available from the Patent Office at 25¢ each. Address the Commissioner of Patents, Washington, D. C., for copies and for general information concerning patents or trademarks.

U. S. Patents from Official Gazette—Vol. 637, Nos. 2, 3, 4, 5 and Vol. 638, No. 1

Organic

Producing an aryl indan hydrocarbon which comprises reacting in the presence of an acid-acting catalyst a branched-chain olefin and a metadialkylated aromatic hydrocarbon. 2,519,577. Universal Oil Products Co.

Preparation of a di-thioether by reacting an organic disulfide with a compound affording a mono-olefinic hydrocarbon in the presence of a chemical compound which is an acidic condensation catalyst. 2,519,586. Standard Oil Co., Indiana.

Polyazo dyestuffs. 2,519,651. Ciba Ltd.

Separation of hydrazobenzenes from zinc sludge. 2,519,673. American Cyanamid Co.

Production of 1,1,1,6,6,6-hexachlorohexane comprising condensing 1,1,1,3-tetrachloropropane in the presence of water and a chlorine acceptor selected from the group consisting of iron, copper, and aluminum. 2,519,691. Socony-Vacuum Oil Co., Inc.

Tetra-(carboxyalkyl)-1:2-diamino-cyclohexanes. 2,519,708. J. R. Geigy A. G.

1-carbamyl-4-heterocyclo-piperazines. 2,519,715. American Cyanamid Co.

Producing 3,4-(1',3'-diaralkyl-2'-keto-imidazolido)-2-keto-thiophanes by reacting a compound from the group consisting of a 3,4-(1',3'-diaralkyl-2'-keto-imidazolido)-2-keto-5-acyloxy-tetrahydrofuran, 1,3-diaralkyl-cis-4-carboxy-5-formyl-imidazolidone-2 and its cyclic form, 3,4-(1',3'-diaralkyl-2'-keto-imidazolido)-2-keto-5-hydroxy-tetrahydrofuran with an alkali metal hydrosulfide in an aqueous medium, and reducing the reaction product with nascent hydrogen. 2,519,720. Hoffman-LaRoche Inc.

Preparation of formaldehyde by air oxidizing methanol with a manganese phosphate catalyst. 2,519,751. E. I. du Pont de Nemours & Co.

Preparation of ethylene glycol diacetate by acting on acetic acid and ethylene with an oxidizing gas in the presence of a catalyst selected from the group consisting of hydrobromic acid and aliphatic organic bromides capable of generating free hydrobromic acid under oxidizing conditions. 2,519,754. E. I. du Pont de Nemours & Co.

In vapor phase conversion with oxygen of methanol to formaldehyde, the improvement which comprises conducting the conversion in two steps, in the first step oxidizing and dehydrogenating a part of the methanol over a silver catalyst, and in the second step oxidizing without appreciable dehydrogenation, over a metal oxide catalyst without appreciable oxidation of the hydrogen to water. 2,519,788. E. I. du Pont de Nemours & Co.

In preparation of ethylene diamine the steps which comprise aminating aqueous formaldehyde cyanhydrin to aminoacetonitrile, heating the crude amination mixture in water, passing the resulting liquid-vapor mixture into a separating zone and separating the aminoacetonitrile vapor, cooling and subjecting to hydrogenation in the presence of a hydrogenation catalyst. 2,519,803. E. I. du Pont de Nemours & Co.

Conversion of beta-, gamma,- and delta-tocopherol to alpha-tocopherol by aminoalkylation and reduction. 2,519,863. Eastman Kodak Co.

Preparing a methylfluorosilane by dissolving a liquid polysiloxane selected from the class consisting of hexamethyldisiloxane and tetramethyl-1,3-bis-(pentamethyldisiloxanylmethyl) disoloxane in concentrated sulfuric acid, passing anhydrous gaseous hydrogen fluoride through the acid solution and isolating a methyl fluorosilane. 2,519,879. General Electric Co.

Beta-dimethylaminoethylphenothiazines. 2,519,886. Societe des Usines Chimiques Rhone-Poulenc.

Removal of the sodium salt of lignoceric acid from a tall oil soap. 2,519,903. U. S. Industrial Chemicals, Inc.

Preparation of lactic acid esters by contacting a vapor of a saturated aliphatic monohydric alcohol with an adsorbent consisting of peanut hulls, peat moss, cotton seed hulls, ground corn cobs, straw and bagasse impregnated with a concentrated spent fermentation solution containing lactic acid. 2,519,906. U. S. Industrial Chemicals, Inc.

Alkyl dimethyl benzyl ammonium naphthenate. 2,519,924. Nuodex Products Co., Inc.

Resolution of chlorosilane mixtures by hydrolyzing with water a mixture of tetrachlorosilane and trimethyl chlorosilane, contacting the hydrolysis reaction product in an aqueous medium with an alkali-metal hydroxide to obtain a layer comprising hexamethyl disiloxane, and isolating the hexamethyldisiloxane in the aforesaid layer. 2,519,926. General Electric Co.

Preparation of dialkoxyalkane-nitriles by reacting hydrocyanic acid and an orthoester. 2,519,957. American Cyanamid Co.

Electrochemical process of making fluorine-containing carbon compounds which comprises electrolyzing a current-conducting mixture of an organic starting material in liquid hydrogen fluoride free from water. 2,519,983. Minnesota Mining & Mfg. Co.

Dialkoxylylene-bisquaternary salts. 2,519,999. Rohm & Haas Co.

Extracting from a mineral oil a compound selected from the group consisting of toluene and xylenes with liquid phenol. 2,520,006. Standard Oil Development Co.

Acid addition salts of 1,cyclopentyl-2-methylaminopropane. 2,520,015. Eli Lilly and Co.

Reducing an alkyl nicotinate with lithium aluminum hydride to produce pyridyl-3-carbinol. 2,520,037. Hoffman-La Roche Inc.

Preparing pyridoxine hydrochloride by impregnating an activated charcoal with a reducible palladium salt and reducing the salt in the presence of alcohol, water and acid by treatment with hydrogen, treating 2-methyl-3-nitro-4,5-dicyano-6-chloropyridine therewith while adding additional hydrogen, removing the charcoal catalyst, treating the thus formed 2-methyl-3-amino-4,5-bis-(amino-methyl)-pyridine tri-acid with nitrous acid and isolating the thus formed pyridoxine as its hydrochloride. 2,520,038. American Cyanamid Co.

Cyclizing ethyl-β-carbethoxy-β-m-chloranilino acrylate to quinoline compounds by heating in the presence of a solvent consisting of diphenyl ether. 2,520,041. U.S.A. as represented by the Secretary of War.

Preparing a mixture comprising essentially 5-and 7-chloro-4-hydroxy-quinoline-2-carboxylic acid. 2,520,042. U.S.A. as represented by the Secretary of War.

Producing 4,7-dichloro-8-methylquinoline from 8-methyl-7-chloro-4-hydroxy-2-quinoline carboxylic acid. 2,520,043. U.S.A. as represented by the Secretary of War.

3, 4-bis-(m-methyl-p-hydroxyphenyl)-hexane. 2,520,052. Reed & Carnrick.

Preparing hydroxypyrazines by reacting a 1, 2-dicarbonyl compound with an α-aminocarboxylic acid amide. 2,520,088. Eli Lilly and Co.

Reacting with epichlorhydrin a compound of the group consisting of secondary alkyl amines having less than 7 carbon atoms in each alkyl radical and piperidine, treating with an aqueous solution of an inorganic base to form a plurality of phases including an oil phase, separating said oil phase, and treating with an excess of ammonia

to form the desired product. 2,520,093. Sharples Chemicals Inc.

Production of beta-picoline by reacting acrolein with ammonia in the presence of ammonia and a catalyst consisting of boron phosphate. 2,520,097. Shell Development Co.

Sulfurized unsaturated ketones. 2,520,101. Socony-Vacuum Oil Co., Inc.

Condensation products of diamines and fatty acids. 2,520,102. Commercial Solvents Corp.

Poly-(2-nitroalkyl) amines. 2,520,104. Carl T. Bahner.

Paper & Pulp

Producing an improved wood pulp from a refined wood pulp containing not over 0.15% of natural other extractable matter consisting of saponifiable matter and not over 0.07% of oil soluble unsaponifiable matter and adjusting the percentages thereof to a predetermined norm, by the addition to the pulp of at least one of the said forms of ether extractable matter, the saponifiable addition being a compound of the group consisting of fatty acid and resin acid which when saponified is a water soluble soap, and the unsaponifiable addition being an oil soluble alcohol. 2,518,680. Rayonier Inc.

Regenerating a spent cooking liquor resulting from the digestion of a cellulose-lignin complex with an alkali metal sulphide. 2,518,957. Alfred M. Thomsen.

Petroleum

Lubricant comprising an oil dispersible reaction product of a hydrocarbon unsaturated non-tertiary amine containing a straight chain hydrocarbon radical having at least 12 carbon atoms and at least one olefinic double bond and phosphorus pentasulfide. 2,516,844. Standard Oil Co., Ohio.

Desulfurizing low boiling petroleum hydrocarbons without change in olefin content. 2,516,876. Gulf Research & Development Co.

Desulfurizing a high boiling petroleum oil by treating vapors with a contact comprising a support and a nickeliferous reactant in the form of nickel oxide in the presence of hydrogen. 2,516,877. Gulf Research & Development Co.

Emulsification-inhibited polyacrylate-containing oil compositions. 2,516,914. Tide Water Associated Oil Co.

Catalytic conversion of carbon monoxide and hydrogen into a mixture of hydrocarbons, oxygen-containing compounds, water and the like. 2,516,940. Texas Co.

Synthesis of normally liquid hydrocarbons and oxygen-containing organic compounds by the interaction of carbon monoxide and a synthesis reactant selected from the group consisting of hydrogen and olefins in the presence of a cobalt catalyst. 2,517,035. Texas Co.

Synthesis of hydrocarbons and oxygenated hydrocarbons by the catalytic interaction of synthesis reactants comprising carbon monoxide and hydrogen in contact with a catalyst comprising cobalt and a composite supporting material consisting of uncalcined diatomaceous earth, and alumina. 2,517,036. Texas Co.

Catalytic polymerization of gaseous olefinic hydrocarbons containing molecular oxygen. 2,517,066. Texas Co.

Pyrolytic conversion of hydrocarbons. 2,517,139. Sinclair Refining Co.

Pyrolytic conversion of hydrocarbons. 2,517,140. Sinclair Refining Co.

Pyrolytic conversion of hydrocarbons. 2,517,141. Sinclair Refining Co.

Producing valuable conversion products from CO and H_2 by a catalytic synthesis from H_2 and CO with a finely divided iron catalyst promoted with potassium. 2,518,315. Standard Oil Development Co.

Mineral oil containing a product resulting from the reaction of a haloalkylthiophene and a compound selected from the group consisting of primary and secondary aryl amines and amines in which the amino radical is from 1 to 2 carbon atoms removed from an aryl radical. 2,518,351. Socony-Vacuum Oil Co.

Separation of nitrogen bases from hydrocarbon oil solutions by combining a volatile base selected from the class of volatile bases consisting of ammonia and the mono-, di- and trimethyl amines and a strong non-volatile polybasic inorganic acid in the presence of water to form an aqueous solution of the normal salt, heating and evaporating a portion of said volatile base to form an aqueous solution of an acid salt of said volatile base and said non-volatile acid, contacting hydrocarbon oil solution of nitrogen bases with said aqueous solution of said acid salt to form a hydrocarbon oil raffinate and an extract. 2,518,353. Union Oil Co. of Calif.

Dehydrogenating butene. 2,518,354. Standard Oil Development Co.

Alkyl substituted thiophene sulfonic acid salts as detergents in mineral oil compositions. 2,518,372. Socony-Vacuum Oil Co., Inc.

Production of a synthetic lubricant by simultaneously alkylating and polymerizing benzene with a cracked distillate in the presence of aluminum chloride. 2,518,529. Societe anonyme dite: Standard Francaise des Petroles.

Cracking with hydrogen fluoride catalyst. 2,518,546. Standard Oil Co., Indiana.

Cracked gasoline containing an inhibitor having the formula: HOC_6H_4-NR-CH_2-C_6H_3(R')(OH). 2,518,577. Universal Oil Products Co.

Breaking petroleum emulsions of the water-in-oil type, by subjecting the emulsion to the action of a reagent comprising a surface-active oxylalkylated derivative of a diphenylolmethane. 2,518,668. Petrolite Corp., Ltd.

Combined hydrocarbon conversion-hydrocarbon synthesis process. 2,518,775. Phillips Petroleum Co.

Obtaining hydrocarbons of higher-molecular weight by reacting olefins with isoparaffins by subjecting a mixture of said hydrocarbons to a temperature above 300°F. and a pressure over 100,000 lbs. per square inch. 2,519,072. Standard Oil Development Co.

Sweetening a mercaptan-containing hydrocarbon oil to produce a hydrocarbon oil containing disulfides, adding an olefinic hydrocarbon to the sweetened oil, contacting the sweetened hydrocarbon oil in the presence of said olefinic hydrocarbon with liquid hydrogen fluoride. 2,519,587. Standard Oil Co., Indiana.

Preparing a dye adapted to impart a greenish fluorescence to lubricating oils by distilling a heavy gas oil to a residue and thereafter blowing the residue with an oxygen-containing gas. 2,519,868. Sinclair Refining Co.

Recovering sulfonates of oil-soluble sulfonic acids from acid-treated hydrocarbon oils. 2,519,930. Gulf Research & Development Co.

Photographic

Light-sensitive layers on a suitable base containing a suitable light-sensitive diazo compound and an azo coupling component. 2,516,931. General Aniline & Film Corp.

Sensitized solution having relatively high viscosity for a blueprint paper coating containing hydrolyzable potassium sodium hexametaphosphate, alkali ferricyanide, and a weak dissociable ferrous salt in solution. 2,517,111 Edward Jahoda.

Photographic silver halide emulsion containing a water-soluble cobalticyanide. 2,517,541. Jens Herman Christensen.

Aldehyde antistain baths for developed color photographic material. 2,518,686. General Aniline & Film Corp.

A light-sensitive photographic emulsion comprising silver halide and a polyamine sensitizing agent having the general formula: $H_2N(RNH)nRNH_2$ wherein R is an alkylene chain having from 2-4 carbon atoms and n is a positive integer of from 1-5. 2,518,698. Eastman Kodak Co.

Lumazines and alloxazines as catalysts in dye bleach baths for color photography. 2,518,710. General Aniline & Film Corp.

Polymers

Preparing polymers by contacting a homocyclic compound containing a carbonyl radical in the ring with an alkali metal methoxide in the presence of an alcohol of the group consisting of n-butanol, secondary butanol and primary isobutanol. 2,516,835. Monsanto Chemical Co.

N-unsaturated hydrocarbon, N'-phthaloyl substituted urea and polymers thereof. 2,516,836. American Cyanamid Co.

Copolymers of unsaturated ethers. 2,516,928. U.S.A. as represented by the Secretary of Agriculture.

Polymer of 2,3-dichloro-1,3-butadiene containing an N,N-dialkyldithiocarbamate. 2,516,945. E. I. du Pont de Nemours & Co.

Plasticized vinyl resin composition—a vinyl choloride polymer containing an ester of p-phenylenedioxydiacetic acid and an alkyl alcohol having from 6 to 12 carbon atoms. 2,516,955. Monsanto Chemical Co.

Ethylene-alkylene oxide copolymers. 2,516,960. E. I. du Pont de Nemours & Co.

Hypophosphorous acid compounds as stabilizers for hydroxyl group containing polymers. 2,516,980. E. I. du Pont de Nemours & Co.

In producing a thermoplastic resinous molding powder of polymerized methyl methacrylate containing a copolymerized member of the group consisting of styrene, methyl

acrylate, ethyl acrylate, and ethyl methacrylate, the improvement which comprises exposing said molding powder in the dry form to vapors of a compound of the general formula R-SH, in which R represents a member of the group consisting of hydrogen and alkyl groups. 2,517,127. Rohm & Haas Co.

Water-soluble, thermosetting resinous product obtained by reacting in aqueous solution urea, formaldehyde and oxazolidine. 2,517,128. Rohm & Haas Co.

Oil-soluble resin which comprises the heat reaction product of hydroxy-dihydro-dicyclopentadiene and the heat reaction product of maleic anhydride and an ethylenically unsaturated monovinyl benzene homopolymer. 2,517,222. Monsanto Chemical Co.

Solid polymer of a substance selected from the group consisting of vinyl choloride, vinyl acetate and vinylidene chloride in combination with an ester of 3,5,5-trimethyl-1-hexanol and a monobasic organic acid selected from the group consisting of formic, stearic, methacrylic, oleic, ricinoleic, lauric, levulinic, acetic, propionic, butyric, hexoic abietic, chlorbenzoic and benzoic. 2,517,350. Imperial Chemical Industries Ltd.

Solid polymer of a substance selected from the group consisting of vinyl chloride, vinyl acetate, vinylidine chloride in combination with an ester of 3,5,5-trimethyl-1-hexanol and a polybasic organic acid selected from the group consisting of phthalic, adipic, sebacic, succinic, tartaric, aconitic and tricarballylic acids. 2,517,351. Imperial Chemical Industries Ltd.

Solid polymer of a substance selected from the group consisting of vinyl chloride, vinyl acetate, and vinylidene chloride in combination with an ester of 3,5,5-trimethyl-1-hexanol with a monobasic organic acid selected from the group consisting of formic, stearic, methacrylic, oleic, ricinoleic, lauric, acetic propionic, butyric, hexoic, abietic, glycollic, benzoic and chlorobenzoic acids and an ester of 3,5,5-trimethyl-1-hexanol with a polybasic organic acid. 2,517,352. Imperial Chemical Industries Ltd.

Solutions of acetone-insoluble polyvinyl chloride in a mixture of acetone and perchloroethylene. 2,517,356. Societe Rhodiaceta.

Compositions comprising an acrylonitrile polymerization product and a cyanoalkylaminoacetonitrile. 2,517,544. American Cyanamid Co.

Composition of matter comprising an alicyclic ketone and a copolyamide obtained by the condensation polymerization, with carbon dioxide evolution, of a mixture of the N-carboanhydrides of a plurality of aliphatic alphamonoaminomonocarboxylic acids having no more than one hydrogen on the alpha carbon. 2,517,610. E. I. du Pont de Nemours & Co.

Polyvinyl chloride plasticized with a chlorinated hydrocarbon fraction. 2,517,656. Compagnie Francaise de Raffinage (Societe Anonyme).

Subjecting a mixture of propylene and a propylene polymer, the components of which contain less than about 12 carbon atoms per molecule, to the action of a solid phosphorus-containing polymerization catalyst, recovering a propylene tetramer fraction, contacting the last-named fraction with a phosphorus-containing polymerization catalyst and recovering the resultant product comprising a fraction boiling in the range of from about 335° F. to about 435° F. 2,517,720. Universal Oil Products Co.

Resinous polysiloxane. 2,517,777. Dow Corning Corp.

Formaldehyde condensation product of the organic heat condensation product of dicyandiamide with a cycloaliphatic ketone selected from the group consisting of cyclohexanone, cyclohexylidene, cyclohexanone, and cyclopentanone. 2,517,824. American Cyanamid Co.

Dry plastic composition containing urea-formaldehyde condensate, plaster of paris, wheat flour, and veneer dust. 2,517,906. Sara M. Mayfield.

Polymeric reaction product of a hydrocarbosilanediol and a boronic acid. 2,517,945. E. I. du Pont de Nemours & Co.

Making uniformly 2 subatituted glucopyranose polymers by reacting glucopyranose polymers with alkali metal hydroxide in a non-aqueous alcoholic system. 2,518,135. Ohio State University Research Foundation.

Production of a polyamide polymer, by heating a diamine selected from the group consisting of ethylene diamine, propylene diamine, tetra-methylene diamine, and pentamethylene diamine, with a polyene monobasic fatty acid of from 8 to 26 carbon atoms to produce a polyamide. 2,518,148. Armour and Co.

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Curing of hydrocarbon-substituted polysiloxane resins with benzyl trimethyl ammonium butoxide. 2,518,160. General Electric Co.

Titanating and insolubilizing polyvinyl alcohol film which, after treatment, is transparent to visible light and insoluble in boiling water which comprises swelling with an aqueous medium, and reaction with a solution of a water-soluble, chlorine-free titanium compound. 2,518,193. E. I. du Pont de Nemours & Co.

Preparing copolymers from alkylene glycols and di(hydroxyalkyl) sulfides in the presence of a dehydration catalyst. 2,518,245. Shell Development Co.

Acid hardenable adhesive, the resin syrup component of which comprises a urea-formaldehyde resin, and furfuryl alcohol. 2,518,388. American Cyanamid Co.

Polymeric materials containing a plurality of four-carbon glycol units. 2,518,440. E. I. du Pont de Nemours & Co.

Vinylidene chloride copolymer plasticized with a polyoxyalkylene ether of a ring dehydration product of a hexitol. 2,518,442. E. I. du Pont de Nemours & Co.

Making a soluble resinous reaction product by heating an abietic acid ester, with an ester of a conjugated diene alpha-beta olefinic dicarboxylic acid adduct and a beta-unsaturated monohydric alcohol containing from 3 to 4 carbon atoms. 2,518,495. ¼ to Montclair Research Corp. and ¼ to Ellis-Foster Co.

Resinous composition comprising the reaction product of a rosin polyhydric alcohol ester with the esterification product of a polyhydric alcohol with a monester of a dicarboxylic acid and a beta-unsaturated monohydric alcohol having from 3 to 4 carbon atoms. 2,518,496. ½ to Montclair Research Corp. and ¼ to Ellis-Foster Co.

Polymerization products of conjugated dienes, vinyl compounds, and vinyl esters. 2,518,509. Armstrong Cork Co.

Production of a resinous product by reacting a carbohydrate ether containing at least one allyl ether group per hexose with an unsaturated ester of a dicarboxylic dienophilic acid adduct of a mixture of cyclic polyolefinic hydrocarbons. 2,518,519. Universal Oil Products Co.

Polymerization of 1,3-dienes in the presence of beta-unsaturated aliphatic iodides. 2,518,573. E. I. du Pont de Nemours & Co.

Treating an aqueous solution to effect an exchange of anions comprising contacting said solution with particles of an anion exchange resin prepared by condensation of a polyethylene polyamine with an aldehyde selected from the class consisting of formaldehyde, furfural, monosaccharides and disaccharides and a mononitroalkane. 2,518,956. Permutit Co.

Producing a synthetic resin by reacting formaldehyde and N,N-ethylene urea. 2,518,963. Libbey-Owens-Ford Glass Co.

Structures of ethylene polymer the surfaces of which have uniformly distributed thereon as an anti-static and slip promoting agent a water soluble alkyl aryl polyglycol ether of the formula: $R\text{-}O\text{-}(CH_2CH_2O)x\text{-}H$. 2,519,013. E. I. du Pont de Nemours & Co.

Low temperature polymerization of mixed olefins with Al_2ClBr_5 catalyst. 2,519,034. Standard Oil Development Co.

Physical mixture of 2 separately copolymerized materials, the one being a hard and brittle copolymer of 30 to 80% by weight of a styrene type compound and styrene having 1 to 2 chlorine atoms substituted on the ring, and 70 to 20% by weight of isobutylene, the other copolymer being tough and resilient and being a copolymer of 30 to 95% by weight a styrene-type compound and styrene having 1 to 2 chlorine atoms substituted on the ring, and 70 to 5% by weight of isobutylene. 2,519,092. Standard Oil Development Co.

Polymerizing monoethylenic monomers. 2,519,135. E. I. du Pont de Nemours & Co.

Protection of vinylidene chloride polymers from the effects of light with a 2-hydroxy 3,5-dichloro acylophenone. 2,519,189. Dow Chemical Co.

Cellulosic filler united by polyvinyl chloride. 2,519,442. Societe Anonyme des Manufactures des Glaces et Produits Chimiques de Saint-Gobain, Chauny & Cirey.

Making an oil modified alkyd resin non-yellowing by catalytically hydrogenating the resin. 2,519,492. E. I. du Pont de Nemours & Co.

Preparing a solid polymer of formaldehyde by evaporating to dryness an aqueous solution of formaldehyde containing a non-reactive acid and a metal from the group consisting of iron, cobalt and chromium in the form of the metal and metal salts. 2,519,550. E. I. du Pont de Nemours & Co.

Thiodipropionates-polythene antioxidants. 2,519,755. E. I. du Pont de Nemours & Co.

Esterifying a copolymer of maleic anhydride and at least one polymerizable monovinyl compound, with an alkenol of 3-4 carbon atoms, having the ethylenic group removed from the hydroxyl group by one carbon atom, and straight chain normal alkanol of 6-8 carbon atoms. 2,519,764. E. I. du Pont de Nemours & Co.

Homopolymerization of ethylene in the presence of di(tertiary butyl) peroxide and in the presence of a reaction medium which consists wholly of water. 2,519,791. E. I. du Pont de Nemours & Co.

Production of molding materials by first dissolving a synthetic resin selected from the group consisting of polyvinyl acetate, polyvinyl acetal, polyvinyl chloride and copolymers of polyvinyl acetate and polyvinyl chloride, polystyrene, polymethyl-methacrylate, polymerized esters of acrylic and methacrylic acids in an organic liquid mixture, then mixing water until a viscous emulsion is obtained, thoroughly mixing filler material to produce mass of doughy consistency, and thereafter allowing voltaile constituents to evaporate to bring about a gradual deposition of the synthetic resin on to said filler. 2,519,870. Alfonso Amigo.

Polysiloxanes. 2,519,881. General Electric Co.

Homogeneous transparent polymeric composition which comprises a blend of a copolymer of a mixture of monomers consisting of acrylonitrile, vinyl acetate, and butyl acrylate, and a copolymer of vinyl acetate and butyl acrylate. 2,520,083. Monsanto Chemical Co.

Vinyl resin composition which comprises polyvinyl chloride having intimately dispersed therein an ester of a phenylbenzoic acid and an aliphatic alcohol of the group consisting of hydrocarbon alcohols, oxa-hydrocarbon alcohols, thia-hydrocarbon alcohols, said alcohols having the total of 8 to 14 carbon, oxygen and sulfur atoms. 2,520,084. Monsanto Chemical Co.

Film forming composition which comprises a homogeneous blend of a copolymer of methyl methacrylate and vinyl acetate, and a copolymer of butyl acrylate and vinyl acetate. 2,520,086. Monsanto Chemical Co.

Plasticizing agent consisting of polyphosphates of divalent aryl hydrocarbons. 2,520,090. Monsanto Chemical Co.

Tetrachlorophthalic acid and anhydride curing of aminoplasts. 2,520,100. American Cyanamid Co.

Rubber

Aqueous dispersion comprising rubber latex, a water-soluble dispersing agent selected from the group consisting of alkali metal phosphate, carbonate and silicate and a colloidal water-dispersible and alcohol-precipitable extract of Irish moss, to stabilize the dispersion and decreasing the proportion of vulcanizing material required for a given cure. 2,517,737. Pierce M. Travis, assignor of ¼ to J. D. Silverman and ¼ to Morris Hirsch.

Laminated sheet consisting of one ply of rubber hydrochloride and one ply of regenerated cellulose united by a mixture of paraffin and oxidized cyclized rubber. 2,517,764. Wingfoot Corp.

Vulcanized isobutylene rubber obtained by vulcanizing an isobutylene rubber stock containing sulfur, a isobutylene rubber vulcanization accelerator of the class consisting of dithiocarbamates, thiuram sulfides and mercaptobenzothiazoles, and a dinitrosobenzene. 2,518,576. E. I. du Pont de Nemours & Co.

Curing of chloroprene polymers by incorporating an antimony sulfide, and heating. 2,518,579. E. I. du Pont de Nemours & Co.

Vulcanization of elastoprenes using as an accelerator an amine salt of 2,6-dimercapto-benzo (1,2,4,5) bisthiazole. 2,518,670. American Cyanamid Co.

Curing a rubbery synthetic interpolymer of isobutylene with a diolefin, comprising adding a p-quinone dioxime ester curing agent and a lead and oxygen containing compound selected from the class consisting of PbO and its hydrates and heating. 2,519,100. Standard Oil Development Co.

Specialties

Oil base soluble in an aqueous medium for use as a rust inhibitor and metalworking lubricant containing water, sodium hydroxide, formalin (approx. 40% HCHO), glycerin, ethylene glycol ethyl ether, hydroxy aliphatic hydrocarbon carboxylic acid having 18 carbon atoms and not more than one double bond in the molecule, sodium petroleum sulfonate (oil-soluble), and extra winter strained lard oil. 2,516,838. Shell Development Co.

Inhibiting sap stain and mold growth in green wood comprising a mixture of borax, modified soda and sodium pentachlorophenate and an additive agent selected from

the group consisting of ammonium silicofluoride, magnesium silicofluoride, and zinc silicofluoride. 2,517,076. Wyandotte Chemicals Corp.

Liquid for rendering scratches on motion picture film temporarily invisible, consisting of a non-ignitable halogenized hydrocarbon having a wax dissolved therein. 2,517,201. Klar-Film A. G.

Coloring walnut sapwood using hydroquinone. 2,517,296. American Walnut Manufacturers Association, Inc.

Asphalt composition consisting of asphalt and an oleophilic carboxylic acid and a polysulfide. 2,517,564. Shell Development Co.

Clear soluble uniphase liquid composition adapted to remove fingerprint deposits from non-absorbent surfaces consisting of a clear soluble oil, water and a substantially volatile, liquid, organic compound selected from the group consisting of benzene, trichloroethylene and carbon tetrachloride, said clear soluble oil consisting of spindle oil, sodium naphthasulfonate, sulfated fish oil, water and diacetone alcohol. 2,517,636. Shell Development Co.

Cleaning composition stabilized against decomposition consisting of a volatile aliphatic chlorohydrocarbon solvent, having as ring atoms, three carbon atoms, one nitrogen atom and one atom selected from the class consisting of oxygen and sulfur and wherein any ring atom substituents other than hydrogen are alkyl groups containing less than 4 carbon atoms. 2,517,893. E. I. du Pont de Nemours & Co.

Metal degreasing composition stabilized against aluminum-induced decomposition consisting of trichloroethylene and cyclohexene. 2,517,894. E. I. du Pont de Nemours & Co.

Cleaning composition stabilized against metal-induced decomposition consisting of a volatile aliphatic chlorohydrocarbon solvent and a saturated aliphatic 1,3-diketone selected from the group consisting of acetylacetone, propionylacetone, butyrylacetone, isobutyrylacetone and 2,2-dimethyl acetylacetone. 2,517,895. E. I. du Pont de Nemours & Co.

Self-polishing wax composition comprising a solution in a volatile solvent of petroleum distillate naphtha having a substantial aromatic type hydrocarbon content containing a highly chlorinated wax and a material adapted to inhibit inherent tackiness of said chlorinated wax consisting of a wax-compatible hard resin. 2,517,904. E. L. Bruce Co.

Composition for inhibiting sap stain and mold growth in green wood comprising a mixture of magnesium silicofluoride and a sodium borate. 2,517,958. Wyandotte Chemicals Corp.

Hydraulic cement composition comprising Portland cement, cellular aggregate of burnt shale, cottonwood fibers, fly ash, butyl stearate and mineral spirits, and water. 2,517.-993. Dextone Co.

Decontaminant for vesicant gases consisting of bleaching powder, sugar, comminuted asbestos powder, sodium dodecyl sulfate and water. 2,518,345. U.S.A. as represented by the Secretary of War.

Drilling fluid stable to salines, comprising water, finely divided inorganic solids suspended therein, and a treating agent prepared by hydrolyzing a water dispersible gum in a water dispersion in the absence of an oxidizing agent and neutralizing with a neutralizing agent of the group consisting of ammonia, an amine and a basically reacting compound of an alkali metal. 2,518,439. Union Oil Co. of Calif.

Method of printing and preventing offset comprising printing an ink comprising thermosetting, water-insoluble, glyceryl phthalate and an alkali metal salt thereof colloidally dispersed in a vehicle selected from the group consisting of water miscible liquid glycols, and polyglycol ethers and a pigment, and after printing applying to the surface an aqueous solution of a salt of a metal selected from the group consisting of barium, calcium and zinc. 2,518,607. Donald Robert Erickson.

Lotion shampoo which comprises an opaque stable colloidal suspension of a hydrophobic saponifiable wax in a liquid mixture of water and an anionic hydrophilic lathering detergent. 2,519,062. Nopco Chemical Co.

Aqueous dispersion for imparting flame-resisting characteristics to cotton cloth and other fibrous cellulosic materials comprising water and a finely divided, oxygen-containing substance of the group consisting of tin, titanium, antimony and bismuth oxides, a thermoplastic substance containing at least 20% halogen, all being dispersed in water containing a water-soluble salt of an oxygen-containing acid of phosphorus and a water-soluble nitrogenous substance of the group consisting of urea, biuret, ammonium cyanate, ammonium dicyanimide and mixtures thereof, said dispersion also containing ammonium hydroxides. 2,519,348. American Cyanamid Co.

Imparting flame-resistance to a cellulosic textile material by impregnating with an aqueous liquid composition containing a water-soluble salt of an oxygen-containing acid of phosphorus and a water-soluble nitrogenous substance. 2,519,388. American Cyanamid Co.

Negative electrode for alkaline cells comprising pulverulent, metallic cadmium and a small proportion of polyvinyl alcohol. 2,519,399. Ralph Roberts.

Germicidal composition comprising formaldehyde and bis-(2-hydroxy-3,5,6-trichlorophenyl) methane. 2,519,565. Bard-Parker Co., Inc.

Chewing gum base including a natural gum, polyvinyl acetate, and a polymer of the composition $(-SC_2H_4OCH_2O-C_2H_4S-)$. 2,519,775. American Chicle Co.

Treating fibrous cellulosic materials to impart flame-resistance with an association of an aqueous liquid composition containing a water-soluble salt of an oxygen-containing acid of phosphorus and a water-soluble nitrogenous substance of the group consisting of cyanamide, dicyandiamide and mixtures thereof, and an aqueous liquid composition containing a finely divided oxide of antimony and a thermoplastic halogen-containing organic substance. 2,520,103. American Cyanamid Co.

Textiles

Heating a keratin material in neutral aqueous solution containing a sulfur-containing reductive, djsulphide-splitting agent and a synthetic detergent selected from the group consisting of alkali metal salts of alkyl aryl sulphonates and of alkyl sulphates. 2,517,572. U.S.A. as represented by the Secretary of Agriculture.

Chemically modifying wool by reacting wool with beta-propiolactone. 2,517,573. U.S.A. as represented by the Secretary of Agriculture.

Treatment of woven, knitted and netted fabrics comprising organic derivatives of cellulose, by depositing a polyvinyl compound selected from the group which consists of copolymers of vinyl chloride and vinyl acetate and acetone-insoluble polyvinyl chloride, dissolved in a mixture consisting of methyl ethyl ketone the remainder being a methyl alkyl ketone containing at least 5 carbon atoms. 2,517,646. Celanese Corp. of America.

Predoped airplane fabric having a precipitated coating thereon of a composition; cellulose nitrate, castor oil, polyvinyl alcohol, and isopropyl naphthalene sulfate. 2,517,852. E. I. du Pont de Nemours & Co.

Fiber comprising polymeric N,N'-hexamethylenebenzeneboronamide. 2,517,944. E. I. du Pont de Nemours & Co.

Quaternary ammonium textile treatment agents of the formula $R(OCONHCH_2AX)n$ wherein R represents a radical of the group consisting of alkylene radicals, higher fatty acid esters of polyalkylols, and higher fatty acid amides of alkylene amines, X is a halogen radical, n is greater than I and A represents the radical of a nitrogenous compound selected from the group consisting of heterocyclic tertiary amines, aliphatic tertiary amines, thiourea and tetramethyl thiourea. 2,518,266. Imperial Chemical Industries Ltd.

Quaternary textile treating agents of the formula $(HOCH_2-NHOCO)m-R-(OCONHCH_2AX)n$ wherein R represents a radical of the group consisting of alkylene radicals, higher fatty acid esters of polyalkylols, and higher fatty acid amides of alkylene amines, X is a monovalent radical selected from the group consisting of halogen and alkyl sulphate, A represents a member from the group consisting of aliphatic and heterocyclic tertiary amines, m is selected from the group consisting of zero and positive integers and n is a positive integer, the sum of $m+n$ being greater than I. 2,518,267. Imperial Chemical Industries Ltd.

Production of polyethylene terephthalate from ethylene glycol and dimethyl terephthalate to form by ester interchange, bis-2-hydroxy-ethyl-terephthalate, and thereafter polymerizing to a fiber-forming linear polymer by heating. 2,518,283. E. I. du Pont de Nemours & Co.

Coating a textile fabric by preparing a composition comprising an intimate mixture of chlorosulfonated ethylene polymer and polymeric methyl methacrylate, dispersing said mixture in a volatile solvent, applying said composition on a textile fabric heating to evaporate the solvent and further heating to cure the said coating. 2,519,068. E. I. du Pont de Nemours & Co.

Improving keratinaceous animal fibers by treating with a weakly acidic solution containing precondensation products of formaldehyde and a compound of the class consisting of resorcinol and chloro-substituted resorcinols, centrifuging the thus treated fibers and drying. 2,519,842. American Enka Corp.

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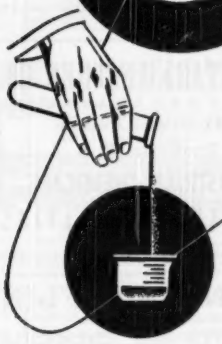

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(Continued from page 926)

90% of the industry is now represented by membership. New members are International Printing Ink; J. M. Huber Corp.; Ander Chemical Co., Inc.; Superior Printing Ink Co., Inc., and Frederick H. Levey Co.

H. Howard Flint, of Howard Flint Ink Co. was elected president of the Institute for the second year during a recent board meeting at which board membership was increased from five to seven members.

• **Magic Valley Processing Co.,** Twin Falls, Idaho, has just appointed Morningstar, Nicol, Inc., exclusive sales agents for its high grade potato starch and chlorinated potato starches. The paper and textile industries as well as food processors are consumers of these materials.

• **Recent laboratory study** of Amberol 750, a fortified rosin ester, has developed new information useful to formulators of wax emulsions, it is reported by the Resinous Products Division of Rohm & Haas Co., Philadelphia. A report of the laboratory study, including directions on preparation of emulsions and suggested formulations, is available on request to the manufacturer.

• **Rubber Avenue,** one of the main streets in Naugatuck, Conn., has been resurfaced with a combination of asphalt and meltable rubber compound developed by Naugatuck chemical division, U. S. Rubber Co., one of the town's principal industries. This surface is expected to give at least twice the wear of straight asphalt resurfacing material, and to reduce maintenance.

• **Armour Laboratories** has under way a research program to increase production and to define the usefulness of Tryptar, the Armour product used in new work reported by an Ohio State University group. Tryptar is the company's brand name for high purity crystalline trypsin, an enzyme produced by the body in the pancreas.

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Chemical Industries

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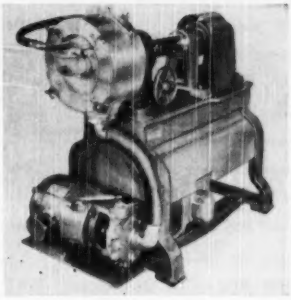

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